

## ABSTRACT

Title of Document: ADAPTIVE REUSE OF THE SEAHOLM  
POWER PLANT: UNITING HISTORIC  
PRESERVATION AND  
SUSTAINABLE PRACTICES

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Master of Architecture, 2011

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Current historic preservation regulations and sustainability systems rarely overlap for a common goal. Historic properties have many inherently sustainable qualities, none of which are capitalized upon by either regulatory body. As sustainability becomes more essential in our modern world, these two industries must come together. This thesis will study how these two may unite to utilize best practices in reusing historic structures.

After studying current sustainability and historic preservation frameworks, a set of values that, when present, formulate holistic sustainability, were created. These values, broken in to economic, environmental and cultural benefits come together for an innovative and education design. Based on these values, a new Leadership in Energy and Environmental Design standard for Historic Properties was created, including a new Social Justice category.

These theories were then tested in an adaptive reuse design project for the historic Seaholm Power Plant in Austin, TX.



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UNITING HISTORIC PRESERVATION AND  
SUSTAINABLE PRACTICES

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Thesis Submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
Master of Architecture  
2011

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## PREFACE

Over the past twenty years, sustainable building design has become an integral part of the architecture profession and a measure of humanity's well being in general. With awareness of environmentally friendly practices, the profession must evolve to meet increasing demands in the new field of "green" building design. Historic preservation and adaptive reuse projects lag behind this integration of the built environment into the sustainable design movement. Perhaps it is fear of sacrificing historical integrity, or perhaps it is green building standards' unwillingness to give credit for inherently sustainable qualities of many historic buildings, but for whatever reason these two fields, though naturally compatible, lack a solid connection, except, perhaps, by their mutual repulsion. The past two years have shown tentative signs of future alliances but nothing as of yet has been concrete steps of strong, mutually beneficial progress.

Sustainable design is the capacity to endure - to exist now and set the stage for the future. To be truly sustainable a building must possess values from all three of the following spheres: environmental, economic and cultural. The current nationally accepted standard for sustainable building design, Leadership in Energy and Environmental Design, focuses primarily on environmental and economic sustainability, with an emphasis on techniques that can be utilized easily in new construction, infrastructure and additions to cultural fabric. These criteria leave holes that are exposed by buildings that have already proven that they can withstand the test of time: historic structures.

Historic buildings are frequently naturally sustainable in all three ways:

environmental, economic and cultural. However, their inherently sustainable characteristics are underappreciated in today's framework for green design, primarily through their social and cultural sustainability characteristics. In this thesis project, I have, by creating a working definition of sustainability, comparing existing historic preservation regulations and green building standards formulated a checklist of what sustainable adaptive reuse projects should use: regulations known as LEED for Historic Properties. These criteria and value sphere were then explored through an adaptive reuse design project.

The preservation and repurposing of the Seaholm Power Plant in Austin, TX became the testing site for the above theories on preservation and sustainable design. By tracing the plant's oil-fired electricity-producing history and its relationship with the city, appropriate design steps were taken to reuse the plant for the mutual benefit of the city, the building owner, the building's historic integrity and the environment.



**Figure 1: Interior of Seaholm Power Plant with generators removed, ready for reuse. (Photo: City of Austin).**

## ACKNOWLEDGEMENTS

*The author wishes to thank the following people for their contributions toward and assistance during the production of this thesis:*

Caroline Wright and Rachel Liebowitz, Texas Historical Commission

Patrice Frey, National Trust for Historic Preservation

Molly Hults and the staff at the Austin History Center

John Rosato, Southwest Development Corporation

Fred Evins, City of Austin

Scott Vieth, Ayers St. Gross Architects

Tom Liebel, Marks, Thomas Architects

Bill McCann, HS&A Project Management

Steve Stelzer, Houston Green Building Resource Center

Carl Elefante, Quinn Evans Architects

Garth Rockcastle, Don Linebaugh and Michele Lamprakos

Ralph Bennett

My parents: David Meltzer and Suzanne Siegel

and *Matthew Barris* for his unfailing love and support.

## TABLE OF CONTENTS

Preface.....	ii
Acknowledgements.....	iv
Table of Contents.....	v
List of Tables .....	vii
List of Figures .....	viii
Chapter 1: Introduction .....	1
Chapter 2: Historic Preservation.....	2
2.1: Historic Preservation Background .....	2
2.2: The Secretary of the Interior’s Standards .....	4
Preservation, Rehabilitation, Restoration, Reconstruction	
2.3: Working with LEED.....	9
2.4: Conclusions.....	10
Chapter 3: Current Sustainable Design Frameworks.....	12
3.1: A Brief History of the Green Building Movement.....	12
3.2: Leadership in Energy and Environmental Design (LEED) .....	14
Sustainable Sites, Water Efficiency, Energy & Atmosphere,	
Materials & Resources, Indoor Environmental Quality	
3.3: Living Building Challenge.....	23
3.4: Conclusions.....	29
Chapter 4: Case Study – Tate Modern Museum.....	30
Chapter 5: Case Study – Miller’s Court.....	36
Chapter 6: Sustainability.....	41
6.1: Sustainability .....	41
6.2: Inherent Sustainability of Historic Properties.....	42
6.3: LEED for Historic Properties .....	43
Chapter 7: City of Austin.....	47
7.1: City of Austin History .....	47
7.2: Context Analysis.....	48
7.3: Zoning.....	51
7.4: Legal Requirements .....	53
7.5: Land Analysis .....	54
7.6: Movement Analysis.....	56
7.7: Sensory Analysis.....	57
7.8: Climate Analysis.....	59

7.9: City of Austin Sustainability .....	62
7.10: 2025 Proposed Development .....	64
Chapter 8: Seaholm Power Plant .....	67
8.1: History .....	67
8.2: Original Processes.....	81
8.3: Site Analysis .....	85
8.4: Cultural Significance .....	87
8.5: Proposed Master Plan Analysis .....	88
8.6: Existing Building Analysis .....	90
Chapter 9: Seaholm Power Plant Adaptive Reuse .....	99
9.1: Proposed Use .....	99
9.2: Values .....	105
9.3: Design .....	112
9.4: LEED HP .....	122
Chapter 10: Public Defense and Conclusions .....	131
Bibliography .....	132

## LIST OF TABLES

Table 1: Austin, TX Average Temperatures .....	61
Table 2: Austin, TX Average Rainfall .....	61



## LIST OF FIGURES

Figure 1: Existing interior of Seaholm Power Plant .....	iii
Figure 2: Levels of Intervention, Secretary of the Interior's Standards .....	5
Figure 3: Secretary of the Interior's Standards .....	9
Figure 4: Bridges Across Thames River to Tate Modern .....	30
Figure 5: Turbine Hall, Tate Modern.....	31
Figure 6: Tate Modern Meets Thames River .....	32
Figure 7: Turbine Hall filled with sunflower seed exhibit.....	33
Figure 8: Tate Modern Section .....	34
Figure 9: Tate Modern basement .....	34
Figure 10: Miller's Court.....	36
Figure 11: Interior of Miller's Court Project .....	37
Figure 12: Courtyard at Miller's Court.....	38
Figure 13: Values sphere for Sustainable Design .....	42
Figure 14: LEED for Historic Properties .....	47
Figure 15: 1930s Warehouse District in Austin.....	48
Figure 16: Downtown Austin Districts .....	50
Figure 17: National Register Historic Buildings .....	51
Figure 18: Historic Districts in Downtown Austin .....	52
Figure 19: Capitol View Corridors in Downtown Austin.....	55
Figure 20: Seaholm District Topography .....	56
Figure 21: Downtown Austin Bus Routes .....	57
Figure 22: Proposed Light Rail Path.....	58
Figure 23: Lines of Sight from Seaholm to Downtown Austin .....	59
Figure 24: Photo of Seaholm Power Plant from Pfluger Bridge .....	60
Figure 25: Austin, TX Prevailing Winds .....	62
Figure 26: Austin, TX Sunpath Diagram.....	63
Figure 27: Austin Transportation Plan.....	65
Figure 28: Downtown Austin Emerging Projects .....	66
Figure 29: Austin Pedestrian Street Plan .....	67
Figure 30: Seaholm Power Plant Southern Doors .....	68
Figure 31: Historic Austin, TX .....	68
Figure 32: MoPac Railroad.....	69
Figure 33: Guy's Town.....	70
Figure 34: City of Austin Power Plant #1 .....	71
Figure 35: City of Austin Dam .....	72
Figure 36: Walter Seaholm .....	73
Figure 37: Construction of Phase 2.....	74
Figure 38: Construction of Power Plant.....	75
Figure 39: Complete Power Plant .....	77
Figure 40: Northwest corner of Seaholm Power Plant .....	78
Figure 41: Seaholm Power Plant.....	79
Figure 42: Step 1, Oil Firing Process.....	82
Figure 43: Step 2, Oil Firing Process.....	83
Figure 44: Step 3, Oil Firing Process.....	84

Figure 45: Steps 4 and 5, Oil Firing Process .....	84
Figure 46: Step 6, Oil Firing Process.....	85
Figure 47: Steps 7 and 8 of Oil Firing Process .....	86
Figure 48: City Connections, Capitol .....	86
Figure 49: City Connections, Congress Street.....	87
Figure 50: City Connections, Long Center .....	87
Figure 51: Seaholm District Master Plan.....	89
Figure 52: Lower Basement.....	92
Figure 53: Lower Basement 2 .....	93
Figure 54: Lower Basement 3 .....	93
Figure 55: Small rooms in Lower Basement .....	94
Figure 56: Upper basement.....	94
Figure 57: Upper basement 2 .....	95
Figure 58: Ground Level.....	96
Figure 59: Ground Level 2.....	97
Figure 60: Ground Level 3.....	97
Figure 61: Program Diagram .....	100
Figure 62: Under Mezzanine Marketing space .....	102
Figure 63: Visiam Pods.....	105
Figure 64: Visiam Processes Diagram.....	105
Figure 65: Values Timeline .....	106
Figure 66: Values 1950-1989.....	107
Figure 67: Values 1989-2011.....	108
Figure 68: Values, Economic.....	109
Figure 69: Values, Cultural.....	110
Figure 70: Values, Water .....	111
Figure 71: Values, Technology.....	112
Figure 72: Site Plan.....	113
Figure 73: North Site Perspective .....	114
Figure 74: Section Perspective.....	115
Figure 75: Lenticular Louvers .....	115
Figure 76: Palimpsest Swatch.....	116
Figure 77: Removed Building Section.....	116
Figure 78: Glass Stair Detail.....	117
Figure 79: Turbine Hall Perspective .....	117
Figure 80: South Façade .....	118
Figure 81: North Façade .....	119
Figure 82: South Wall Section 1 .....	119
Figure 83: south Wall Section 2.....	120
Figure 84: South Wall Section 3 .....	120
Figure 85: Lower Basement Perspective .....	121
Figure 86: Upper Mezzanine Offices Perspective .....	121
Figure 87: Large Section and Plan.....	122
Figure 88: Development Density and community Connectivity Credit Diagram .....	123
Figure 89: Alternative Transportation Credit Diagram .....	124
Figure 90: Alternative Transportation Credit Diagram 2 .....	125

Figure 91: Wastewater Technologies Credit Diagram.....	126
Figure 92: Avoided Impact Credit Diagram .....	127
Figure 93: Green Power credit Diagram .....	127
Figure 94: Historic Integrity Credit Diagram .....	128
Figure 95: Materials Reuse Credit Diagram .....	129
Figure 96: Inspiration and Education Credit Diagram.....	130
Figure 97: Community Engagement Credit Diagram.....	130
Figure 98: Job Creation Credit Diagram.....	131

## CHAPTER 1: INTRODUCTION

Preservation and the green building movement have evolved in parallel over the last century. Both have strong initiatives to do right by Americans in their cultural and environmental legacy. And yet the two rarely coincide, perhaps because of unwillingness to compromise cornerstones of belief systems, perhaps because it would require a great deal of work, creativity and an open mind. But with the way the world, the United States Government and the building industry are trending, one day the two fields must reconcile. Trail-blazing individuals are taking tentative steps to join the fields across the country but just as working modern building and energy codes in to an historic structure are the reality of today, so shall sustainability be the reality of preservation of the future. The question I intend to explore in this thesis is how to engage the two fields to create a compromise between historic integrity and environmental stewardship. Historic structures are already exemplified and significant in their communities, whatever scale that may be. Adding an element of pioneering sustainability would set a greater example to those admiring the historic structure for its role in the community – from then until now. As we as a society evolve, so must our built heritage.

## CHAPTER 2: HISTORIC PRESERVATION

### 2.1: Historic Preservation Background

America is, socially, much younger, than its peers on the world's stage. While preservation took Europe by storm during the Enlightenment, Americans were only starting to construct the buildings that would one day be noteworthy. Initial preservation acts in America focused their efforts on beautiful virgin landscapes, creating the first National Park designations in the world. For Americans, preservation began as a tool to preserve the physical remains of their connection with their fallen heroes. In 1856, the Mount Vernon Ladies' Association was formed to fight a pending sale of George Washington's estate to a developer. These pioneering ladies started a movement and in 1859, outrage echoed around New England when John Hancock's home in Boston did not fare as favorably. As buildings in the Back Bay were razed by the dozen, Boston's citizens were galvanized and the preservation movement as a grassroots mission spread. For decades, American preservation efforts were primarily informal community activism until 1910 when William Sumner Appleton founded the Society for the Protection of New England Antiquities. This organization was initially founded solely to protect Paul Revere's home – the oldest structure in Boston, circa 1680.<sup>1</sup>

As America matured and experienced the fracturing of the Civil War, it sought to define its culture. Buildings that reflected Americans' sense of themselves

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<sup>1</sup> Holleran, Michael. "Roots in Boston: Branches in Planning and Parks." *Giving Preservation A History*. New York: Routledge, 2004.

and their culture were maintained and preserved. This movement was mutually beneficial to the buildings and to the early Americans: the buildings were saved while the sense of identity helped piece together a ripped and bleeding country.

For nearly a century, the historic preservation movement in the United States survived solely on grass roots activism and intermittent state legislation until 1949 when the National Trust for Historic Preservation was formed by congressional order. In the following 15 years, many historic structures were destroyed in America's push to develop an interstate highway system. The destruction of beloved buildings across the country caused a public outcry and sent state governments and the National Trust to the federal government to advocate for a comprehensive national historic preservation program. In 1966 Congress passed the National Historic Preservation Act (NHPA) for "the preservation of irreplaceable heritage."<sup>2</sup>

The NHPA included the expanding of the National Register of Historic Places and the creation of the federal watchdog agency the Advisory Council on Historic Preservation (ACHP).<sup>3</sup> Now that the NHPA had created an enforcing body, the ACHP, a set of regulatory guidelines were necessary. The Department of the Interior was authorized to create said guidelines and thus the "Secretary of the Interior's Standards for the Treatment of Historic Properties" was created.

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<sup>2</sup> 16 U.S.C. §470 Section 1 Part (b) Paragraph (4).

<sup>3</sup> Lea, Diane. "America's Preservation Ethos." *A Richer Heritage*. Chapel Hill: University of North Carolina Press, 2003.

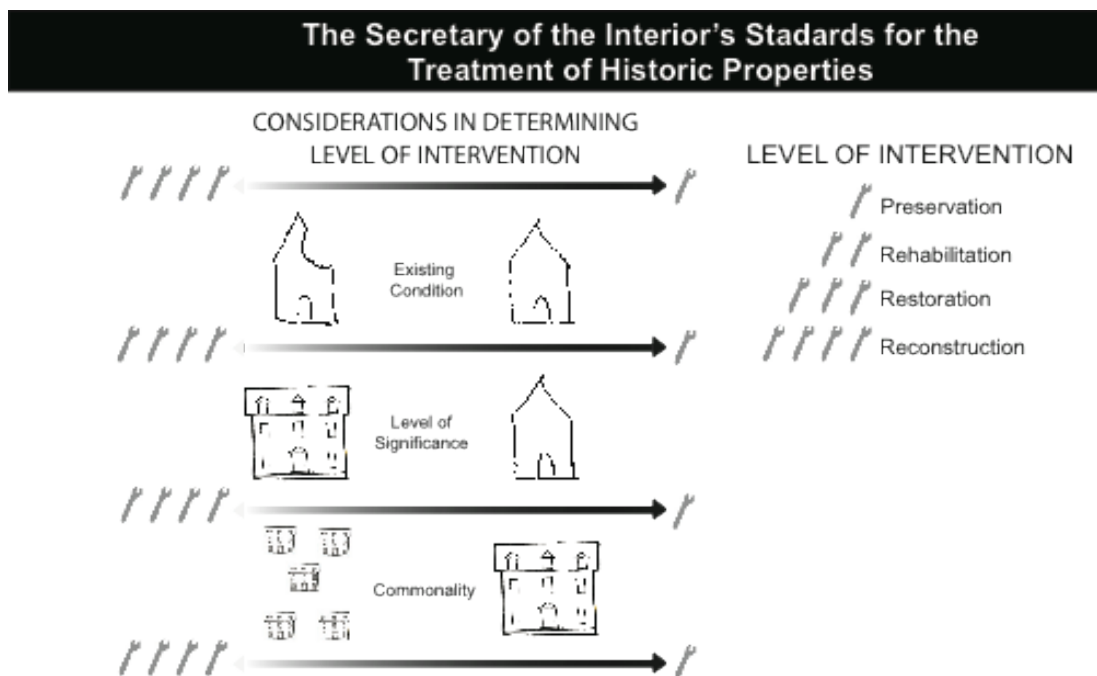
## 2.2: The Secretary of the Interior's Standards

The Standards are a framework for the responsible preservation of America's built resources.<sup>4</sup> The standards are not intended to “be used to make essential decisions about which features of the historic building should be saved” or not, it is merely a philosophical template.<sup>5</sup> The standards are divided in to four categories, listed in order of increasing intervention: Preservation, Restoration, Rehabilitation and Reconstruction. Just as the contents of the Standards are not designed to make specific preservation decisions, they are also not set up to determine how much intervention a property needs. The project architect or developer must make that decision based on four main criteria (as well as any other project-specific factors): relative importance in history, physical condition, proposed use and mandated code requirements.

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<sup>4</sup> National Park Service. Secretary of the Interior's Standards. Web. 1 Feb 2011.  
<[http://www.nps.gov/hps/tps/standguide/overview/choose\\_treat.htm](http://www.nps.gov/hps/tps/standguide/overview/choose_treat.htm)>.

<sup>5</sup> Weeks, Kay, and Anne Grimmer. US Department of the Interior. National Park Service. Secretary of the Interior's Standards for Treatment of Historic Properties. Washington, D.C.: Heritage Preservation Services, 1995. Page 18.



**Figure 2: Levels of Intervention, Secretary of the Interior's Standards. Graphic by Author.**

Relative importance in history ranges from nationally significant resource – be it a nationally beloved and iconic building or a lone surviving artifact from a notorious craftsman to local vernacular in the smallest of towns. The level at which the property is recognized must be taken in to consideration. National Historic Landmarks frequently hold “exceptional significance in American history,” while local historic properties have a much smaller following but are still deemed important by their admirers.

*Preservation*, the first level of the Secretary of Interior's Standards, is used in cases of high historical significance where the building is in good structural and operational condition. Preservation is a maintenance measure to “sustain the existing form, integrity and materials of an historic property” and requires the retention of the



greatest amount of historic fabric in character-defining form, features and details.<sup>6</sup> It is typically used in cases where an historic property retains its original use or a use that requires little to no building layout alterations. If any modification is desired or required (as may be the case to meet modern energy codes or the Americans with Disabilities Act (ADA), changes will only be permitted by the regulatory commission if they affect non-character defining elements of the building. Additions to the building are not permitted under this level of intervention.

The Secretary of the Interior acknowledges that a building must be continually evolving to meet new, contemporary uses. The *Rehabilitation* level of the Standards allows for a greater degree of alteration, or even an addition to an historic structure to meet continuing modern demands permitting that it does not hinder the historic integrity. One must consider in Rehabilitation, just as in Preservation, which elements of an historical structure are considered “character-defining.” While the extent of alterations is more liberal in this tier of the Standards, it is maintained that only non-character defining elements may be reworked. If a character-defining element is in poor or unusable condition, it is to be repaired rather than replaced. Any new elements on the building must be distinguishable from the historic ones so that the historic integrity of the original construction is protected.

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<sup>6</sup> Weeks, Kay, and Anne Grimmer. US Department of the Interior. National Park Service. Secretary of the Interior's Standards for Treatment of Historic Properties. Washington, D.C.: Heritage Preservation Services, 1995. Page 2.

*Restoration* is commonly used for buildings that are noteworthy because they come from a specific time in history, known in the Standards as the interpretive period. A Restoration allows a building to return to “a particular time in its history by preserving materials from the period of significance and removing materials from other periods.”<sup>7</sup> The building’s timeline is crucial in this tier of the Standards. Based on any reliable evidence available, the goal is to return the building to this snapshot in time – the interpretive period. Any elements added before or during that window are restored, repaired or replaced to the greatest degree of historical integrity. Any elements added or altered after the interpretive period are removed. While documentation of design decisions is essential in any preservation project, no matter the level of intervention, it is essential in Restoration, particularly if building elements are removed and discarded.

*Reconstruction* is different from the other three means of building preservation in that it addresses buildings of historical significance that have been partially or completely demolished, by natural or human causes. Reconstruction uses new materials to recreate a vanished building. As Reconstruction is an interpretation and a far more drastic undertaking than the three other categories detailed in the Secretary of the Interior’s Standards, it is used sparingly and only in highly justifiable situations. It is only permissible if a sufficient amount of reliable evidence and building documentation is available to recreate a structure that has a semblance of the original historic integrity. Although Reconstruction is a form of historic preservation,

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<sup>7</sup> Weeks, Kay, and Anne Grimmer. US Department of the Interior. National Park Service. Secretary of the Interior's Standards for Treatment of Historic Properties. Washington, D.C.: Heritage Preservation Services, 1995. Page 2.

it is also new construction and is therefore required to meet all current modern building and energy codes.

The Secretary of the Interior's Standards are federal guidelines that protect properties that are historically recognized on a national level. Historic properties, however, are frequently meaningful in a more vernacular and culture-specific environment. State and local preservation organizations exist to protect historic gems that are not significant enough to warrant national attention, but are locally, regionally or stately beloved. State Historic Preservation Organizations (SHPOs) were also created in the National Historic Preservation Act of 1966. Many of them have adopted the Secretary of the Interior's Standards for their state registers of historic properties. SHPOs' responsibilities include identification and protection of historic and cultural resources, maintaining state registers and adopting state laws that authorize local preservation ordinances, easement programs and rehabilitation tax incentive programs.<sup>8</sup>

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<sup>8</sup> United States. State Preservation Laws. Washington, D.C.: , 2011. Web. 7 Feb 2011. <<http://www.preservationnation.org/resources/legal-resources/understanding-preservation-law/state-law/>>.

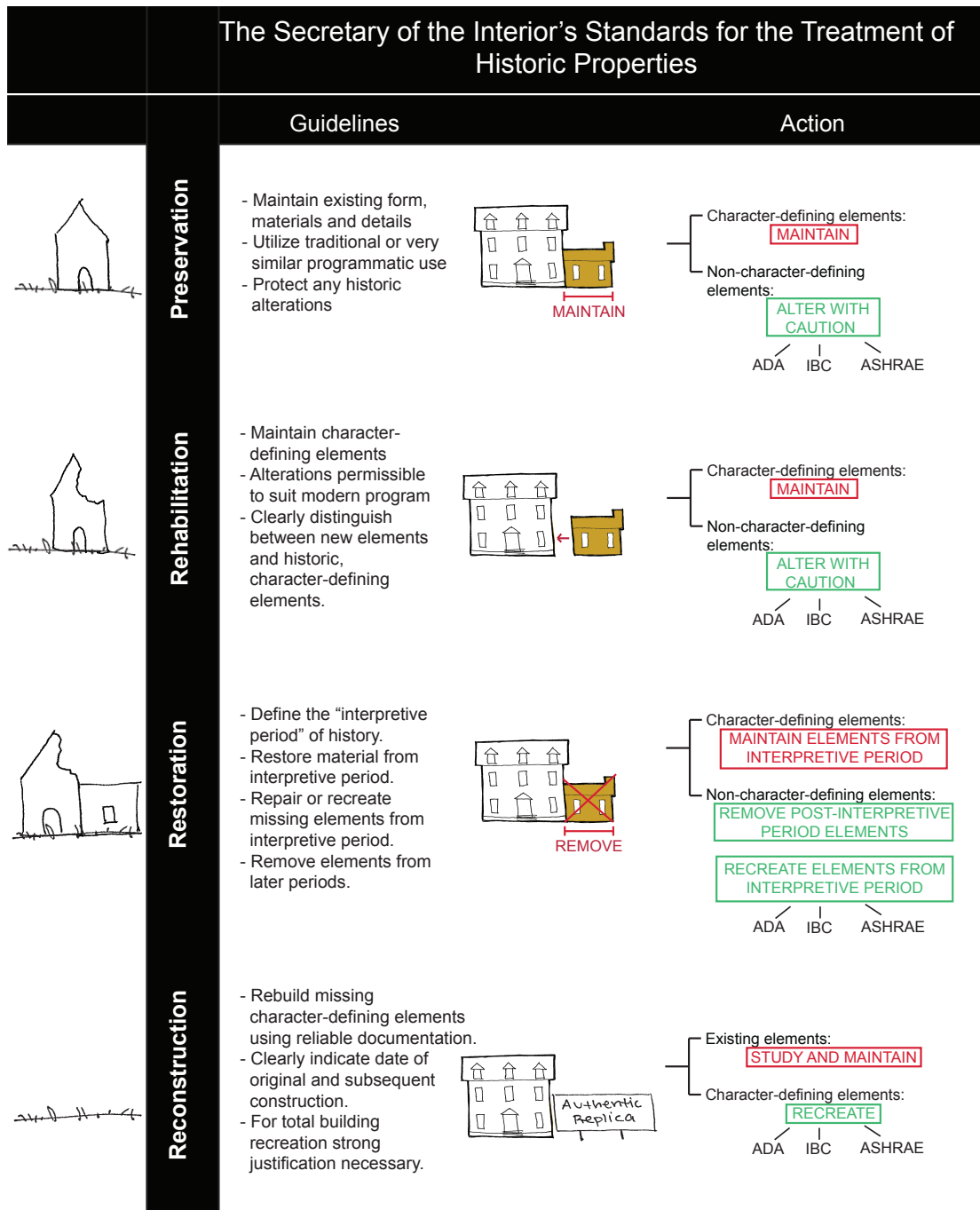


Figure 3: 4 Levels of Secretary of the Interior's Standards. Graphic by Author.

### 2.3: Working with LEED

For the upcoming LEED 2012, the USGBC has been working with the National Trust for Historic Preservation to bridge the gap between the two

frameworks. An early answer to this was released in the fall of 2011. This guideline, The Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings steps beyond the rigid framework of the original Secretary's Standards. The new standards define broad guidelines of how a reused structure might be ushered in to the modern age with little damage to historic integrity. Guidelines place an emphasis on elements that can make a building more green without visibly affecting its historic character – the installation of low flow plumbing fixtures, energy-efficient lighting, replacing windows with those that are more efficient (permitting they are comparable in size and color), etc. As a rule of thumb, the Secretary of the Interior prefers that reuse beings with the least invasive sustainability methods and works toward more invasive resolutions, pending approval from the governing body. In this issuance of guidelines, the Secretary of the Interior acknowledges that the reuse of buildings will necessitate the integration of green building technologies.<sup>9</sup> While these guidelines are a step in the right direction, they do not go far enough yet. The National Trust must be willing to compromise a bit more on adaptive reuse projects so that they may prove competitive and sustainable in comparison to their new construction counterparts.

## 2.4: Conclusion

Maintaining a structure's character-defining elements is essential in retaining the integrity of an historic building. The maintenance of these key building elements

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<sup>9</sup> Weeks, Kay, and Anne Grimmer. US Department of the Interior. National Park Service. Secretary of the Interior's Standards for Treatment of Historic Properties. Washington, D.C.: Heritage Preservation Services, 1995.

is also highly beneficial for the environment - a point that the National Trust is starting to emphasize in their latest publication. The preservation of each character-defining element of an historic building saves raw building materials and the energy consumption used for their transport and installation (embodied energy). Even when the historical status of a building is discounted altogether, an existing building remains a more sustainable choice.

On the other hand, the above outlined historic preservation guidelines bind adaptive reuse projects in to a rigid framework that leads to difficulties in innovation or progressive sustainable designs. Even the new 2011 Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings are too timid. The National Trust will soon be forced to answer the tough question: is preservation best served when static? The evolution of historic buildings and the allowance for them to progressively move with their communities in to the twenty-first century further engages them with the community. It is possible for historic integrity to be respected while progress is made, and the current framework makes this a difficult task for architects.

## CHAPTER 3: CURRENT SUSTAINABLE DESIGN FRAMEWORK

### 3.1: A Brief History of the Green Building Movement

The initial rumblings of the green building movement were heard in the 1970s during the energy crisis. The initiative stemmed from a national and multi-disciplinary desire to be more environmentally friendly and energy efficient (particularly with a reduction in the use of rapidly increasing in value fossil fuels). In the last forty years, a universal awareness of our environment has increased dramatically. This has manifested itself in the field of architecture with goals of minimizing negative impacts on our natural resources and human environment from our buildings. A structure's sustainability may be summed up in to two encompassing goals: minimizing the quantity of resources and energy consumed and reducing the amount of waste produced during a building's lifecycle (construction, operation and destruction).<sup>10</sup>

As the scope of cradle-to-cradle building existence is so vast, it is difficult to measure a collective impact on the environment with each structure. A similar strategy to that evoked by the preservation movement is utilized; series of best-practices criteria have been established, providing guidelines for architects to follow. As in the preservation movement, adhering to these criteria do not guarantee the

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<sup>10</sup> Langmead, Sara Goldfarb. (2009). *Sustainable heritage: Retrofitting historic buildings for improved environmental performance*. (Master's thesis, University of Maryland), Available from Digital Repository University of Maryland. (DRUM).

outcome of the structure. To be true stewards to the environment, a project designer must be highly critical and creative to ensure environmental performance.

The 1970s found the green building movement emerging in Europe, as well as in the United States. While the flagging of the energy crisis in the United States tabled the sustainability initiative, it was full steam ahead in the European Union. In 1993, the EU launched the “SAVE” campaign, mandating the reduction in CO<sub>2</sub> emissions from the built environment. In 2002, this primitive initiative morphed in to the Energy Performance Buildings Directive, which calls for all buildings to meet specific energy use benchmarks, as well as other sustainable criteria.

The same year that the EU began mandating stricter energy requirements, the United States Green Building Council (USGBC) was founded. The first set of sustainable design guidelines (henceforth known as the LEED rating system) was rolled out in 1998: LEED for New Construction v1.0.<sup>11</sup> 13 years after its’ inception, LEED is still a program which is voluntary in the majority of construction in the United States and has little effect on the bulk of the built environment.<sup>12</sup> Today, LEED v3.0 has nine rating systems, one of which will be discussed in particular detail as it is more likely to pertain to the field of historic preservation.

The analysis of credits to come (in both the LEED and Living Building Challenge systems) is for research purposes only. No particular credits are being

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<sup>11</sup> United States Green Building Council. Washington, D.C. 2011. Web. 22 Feb 2011. <[www.usgbc.org](http://www.usgbc.org)>.

<sup>12</sup> “Why Are They Greener Than We Are?” New York Times. New York. 2007. Web. 22 Feb 2011. <[http://www.nytimes.com/2007/05/20/magazine/20europe-t.html?pagewanted=3&\\_r=1](http://www.nytimes.com/2007/05/20/magazine/20europe-t.html?pagewanted=3&_r=1)>.



advocated. While LEED is more attainable and places little to no emphasis on socio-cultural sustainable initiatives, the Living Building Challenge sets very high standards, many of which are humanistic. As both systems represent very different ways to be sustainable, they are both worthy of investigation.

### 3.2 Leadership in Energy and Environmental Design (LEED)

The LEED Green Building Rating System is an internationally recognized certification system, providing third-party verification that a building is designed and constructed to improve its' environmental performance and occupant health. As of February 2011, LEED v3.0 contains nine separate rating systems tailored to building type, condition or use. Building projects in the design or construction phase may apply for LEED certification under the New Construction or Major Renovations (NC), Core and Shell, Commercial Interiors, Schools, Healthcare, Retail, Homes or Neighborhood Development (in pilot phase) rating systems. LEED for Existing Buildings: Operations and Maintenance provides building owners and operators a chance to meet benchmarks in improvements and maintenance to bring their existing structure in to a new phase.<sup>13</sup> Due to the scope of work on the majority of adaptive reuse historic preservation projects, they generally fall under the umbrella of LEED for New Construction or Major Renovations.<sup>14</sup>

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<sup>13</sup> United States Green Building Council. Washington, D.C. 2011. Web. 22 Feb 2011. <[www.usgbc.org](http://www.usgbc.org)>.

<sup>14</sup> National Trust for Historic Preservation. Washington, D.C. 2011. Web. 7 Feb 2011. <[preservationnation.org](http://preservationnation.org)>.

The certification component of the LEED rating system relies on a point collection rubric, which awards points of varying amounts to projects that fulfill certain environmental benchmarks. To ensure a holistic green building, the LEED system is divided into five main categories that address individual categories of sustainability. These five categories are: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources and Indoor Environmental Quality. Points may also be earned in two additional categories of Innovation in Design and Regional Priority. A range from 40- 80+ points may be earned to achieve LEED certification. Certification comes in tiers of prestige, with 40-49 credits earning a building simply a “certified” title, while buildings of good to exemplary sustainable status may earn a silver (50-59 points), gold (60-79 points) or platinum (80+ points) rating.<sup>15</sup>

To understand how adaptive reuse projects of historic buildings function under the current LEED framework, we must understand the goals of each credit and shortcomings in their opportunities. 26,521 projects are LEED certified as of December 2011.<sup>16</sup>

The first of the six categories within the LEED NC system is Sustainable Sites. Quite a few of the credits available in the Sustainable Sites rubric are unavailable to adaptive reuse projects because they are decisions that are site selection decisions – obviously a criteria that an existing building does not have much control over. Electing to choose a particular site based on given criteria is most likely unattainable for an historic property, but sometimes it works out favorably. Credit SS1, Site

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<sup>15</sup> United States Green Building Council. Washington, D.C. 2011. Web. 22 Feb 2011. <[www.usgbc.org](http://www.usgbc.org)>.

<sup>16</sup> United States Green Building Council. Washington, D.C. 2011. Web. 18 Dec 2011. <[www.usgbc.org](http://www.usgbc.org)>.

Selection, tends to have strong performance in historic properties because they are frequently already situated in existing urbanized areas.<sup>17</sup> The majority of the credits in Sustainable Sites will most likely work well for adaptive reuse projects. Development Density and Community Connectivity, Brownfield Redevelopment, Public Transportation Access, Parking Capacity and Light Pollution are all possible, depending on the parameters of the existing site. They are all less likely to compromise historical integrity than the credits aforementioned. There are three credits that should be easily attainable by any historic property, unless there are particular preventative circumstances. Bicycle Storage and Changing Areas requires bicycle racks and showers to be within a certain distance from the front entrance of a building. Fuel Efficient Vehicles requires either designated parking spaces for fuel efficient vehicles, or the purchase of the vehicles themselves for the building occupants. The final credit most likely attainable in the Sustainable Sites category is “Heat Island Effect (Nonroof).” This credit mandates that 50% of all site hardscape be shaded or have an SRI level of at least 29. Or, alternatively, 50% of the site parking be located under ground.<sup>18</sup> Improbable credits within Sustainable Sites include “Habitat” which requires wildlife habitats on site, “Open Space,” which requires a large percentage of site land to be vacant and pervious, Stormwater Quantity and Quality and “Heat Island Effect (roof) which requires the building’s roof to be painted white for greater reflectivity. Given the allotted existing resources

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<sup>17</sup> Frey, Patrice. (2007). *Measuring Up: The Performance of Historic Buildings Under the LEED-NC Green Building Rating System*. (Master’s Thesis, University of Pennsylvania). Available from ScholarlyCommons University of Pennsylvania.

<sup>18</sup> United States. Green Building Council. *LEED for New Construction and Major Renovations*. Washington, D.C.: USGBC, 2011. Print.

of an historic building, the former would rarely be achievable and painting a roof white would most likely compromise the historical integrity of an historic building.

The second category of LEED credits fall under the headline Water Efficiency. These provide more opportunity for historic adaptive reuse projects to excel in these particular sustainable practices. Under the Water Efficiency rubric, there is a required credit – Water Use Reduction. It is mandated to comply with LEED NC standards to reduce water consumption for a building (and site) by 20%. The first optional credit under Water Efficiency is “Water Efficient Landscapes.” As this simply involves the choice of local flora that requires little to no maintenance, it should be achievable by the vast majority of adaptive reuse projects. The other two credits comprising Water Efficiency are a bit trickier, but not impossible. Historic buildings must be able to treat graywater on site or install low flow fixtures to attain “Innovative Wastewater Technologies.” Under “Water Use Reduction,” buildings must meet a higher benchmark of 30-50% water use reduction in a building. Given the existing historical framework, this may be quite difficult in some cases.

The third of the six LEED NC categories is Energy & Atmosphere. Here, there are three required credits that all LEED NC certified projects must meet, and these prove slightly more difficult than the water consumption benchmarks of “Water Use Reduction.” The first prerequisite credit, Commissioning Building Energy Systems, demands that a commissioning agent be appointed to the project to monitor the proposed energy impact at each stage of the process. The “Fundamental

Refrigerant Management” prerequisite is equally straightforward. It mandates that all chlorofluorocarbons (CFCs) be removed from any heating or air conditioning systems. Removing CFCs, or, in more drastic instances, changing mechanical ventilation systems, should not affect the historical integrity of a building. The “Minimum Energy Performance” prerequisite is more of a stretch for historic buildings: one that could potentially compromise their historical integrity. This prerequisite requires that buildings not just meet base ASHRAE codes – they must comply with ASHRAE Advanced Energy Design Guide regulations. Easily attainable “optional” credits within the Energy & Atmosphere category are “Enhanced Commissioning,” “Enhanced Refrigerant Management,” “Optimize Energy Performance” and “Green Power.” The former two are expansions upon the prerequisite credits. As the mechanical ventilation would most likely have to be replaced under the “Fundamental Refrigerant Management” benchmark anyway, it would be an easy transition to a system with zero use of refrigerants altogether. Optimize Energy Performance sets up particular criteria that existing building renovations may aspire to, rather than forcing them in to the same framework as new construction. Under the prescriptions of this credit, buildings must simulate energy performance and meet a threshold of reduced energy use between 8 and 44% less than what is required by ASHRAE. The Green Power credit can and should be met by all buildings, regardless of whether or not they are looking to attain LEED NC certification. Under this credit, at least 35% of the building’s electricity should come from renewable resources.

More challenging credits for historic buildings to achieve in the Energy & Atmosphere category include “On-Site Renewable Energy” and “Measurement and Verification.” The measurement and verification credit is most likely achievable by an historic building, provided that the owner/operator is comfortable with a comprehensive energy use plan and an inspection team coming 1 year after building completion and occupancy to determine whether the goals are being met. On-Site Renewable energy is more invasive to an historic building as it requires energy-manufacturing equipment be installed on the site. This equipment must produce 1-13% of the total energy consumed.

Materials and Resources credits for LEED NC are mixed in applicability. Materials & Resources contains one prerequisite credit, easily attainable by historical buildings, as well as all buildings. Not only that but it is best-practice and should be upheld nation wide. M&R Prerequisite “Storage and Collection of Recyclables” requires that a dedicated area be assigned in the building for the collection and storage of recycled materials, including, at a minimum, paper, corrugated cardboard, glass, plastics and metals. This does not demand a significant amount of space and should not have a major impact on the integrity of an historic structure. The value of this credit vastly outweighs any negative repercussions in this credit instance. Within the Materials & Resources framework, adaptive reuse projects are able to capitalize on some of their inherent sustainability. Under this portion of the LEED NC framework, credit is given to the reuse of walls, floors, roof and interior (non-structural) elements. There is a potential for a maximum of 4 points earned for

building reuse. Reusing 55-95% of existing walls, floors and roof can earn a project 1-3 points. An additional point may be received for 50% reuse of interior nonstructural elements, such as doors, floor coverings and ceiling systems. If a waste management plan is implemented for building elements that are discarded or materials that are wasted during construction, a 50-75% recycled rate for those materials will result in the receipt of another 1-2 points. This credit is known as Construction Waste Management and should be attainable regardless of whether a project is adaptive reuse or new construction. If new materials are required in a project, if 5-10% of those are recycled or salvaged, another 1-2 points are earned (Materials Reuse). The “Recycled Content” credit mandates that 10-20% of all building materials be made from postconsumer recycled content. For both Materials Reuse and Recycled Content, the percentages are based on total cost of materials in a project. As adaptive reuse projects will require less money spent on materials, the required percentage will result in a smaller amount than in new construction projects. All of the above are logically attainable by the vast majority of adaptive reuse projects.

The Regional Materials credit is perhaps less universally attainable for adaptive reuse projects. 1-2 points may be acquired if 10-20% of all materials used on the project come from a 500 mile radius around the project. This credit is entirely dependent upon project location, which is set in stone for adaptive reuse projects. For both the Rapidly Renewable Materials and Certified Wood credits, they are questionably applicable to adaptive reuse projects. They both depend heavily on the

existing building fabric, and whether materials utilized to perpetuate historic integrity are rapidly renewable (such as bamboo) or is wood.

Indoor Environmental Quality credits are meant to create ideal indoor environments for occupants. The two prerequisite credits are achievable for adaptive reuse projects: Minimum Indoor Air Quality and Environmental Tobacco Smoke Control. The former requires that ASHRAE standards be met for the amount of airflow through a space. This may be achieved by natural ventilation. This prerequisite may be invasive in an historic building fabric, but is vital for its adaptive reuse as a building should only function if it can also be a comfortable place to inhabit. This may be a bit of a compromise, but its positives seem to outweigh the negative. The Environmental Tobacco Smoke Control credit is not only possible but also ideal for historic buildings. This prerequisite may be met by banning smoking in the building and within 25 of all entrances, outdoor intakes and operable windows. The first optional credit of the IEQ category is “Outdoor Air Delivery Monitoring.” This credit is also user-friendly and beneficial. It simply requires that the amount of carbon dioxide in mechanically or naturally ventilated air be measured. “Construction Indoor Air Quality Management” is also reasonable to expect of historic properties. Existing or installed absorptive materials should be protected from construction moisture damage and a flush out to cleanse the air should be completed when construction is complete. This credit protects both the building air quality and the workers air quality.



The “Low Emitting Materials” credit is difficult for historic buildings to ensure. This credit requires that all sealants, adhesives, paints, coatings, flooring systems and composite wood not contain volatile organic compounds. If these elements remain untouched in historic buildings, the lack of VOCs cannot be guaranteed. “Controllability of Systems” (Lighting and Thermal Comfort) is possible if light fixtures and mechanical ventilation systems are new or able to be closely monitored and tweaked in individual areas. This is obviously also a case-by-case decision for each adaptive reuse project. The same holds true for the “Thermal Comfort Design & Verification” credits.

Indoor Chemical and Pollutant Source Control requires an even greater compromise for historic buildings. This credit mandates the installation of an entryway system that is at least 10 feet long. This entrance grille is meant to mitigate dirt and particles entering the building. While this credit requires other invasive actions, this is the most dramatic and would directly impact the entry sequence for historic buildings. Likewise, it is difficult to obtain the “Daylight and Views” credit. Possibilities for daylight and views from each room were obviously decided upon the building’s original construction and little flexibility is here to obtain these credits.

Within the miscellaneous few credits at the end of the LEED NC credit list, the Regional Priority credit may prove to be a real victory for historic properties. At the USGBC’s discretion, between 1-4 points may be awarded for projects that have environmental importance in their community. If this building is a true steward to the

environment and icon in the community, it may be applicable for Regional Priority credits. With the addition of this credit category in LEED NC v3.0, a nod was given to the inherent sustainability and community impact of adaptive reuse projects of historic buildings.

The USGBC's efforts to promote green building techniques focus largely on environmental sustainability, but what I seek to advocate is that this is only one component of what a sustainable building should be. USGBC mission means encouraging an "environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life."<sup>19</sup> As of August of 2006, only 32 historic properties have been LEED certified, 32% of all LEED certifications granted. In 2004, the Association of Preservation Technology (APT) formed a technical committee on sustainable preservation and found that there was "failure to recognize performance, longer service lives and embodied energy of historic materials and assemblies."<sup>20</sup>

### 3.3: Living Building Challenge

While LEED is the nationally accepted standard for green building certification that does not mean that it is the best framework for achieving a truly

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<sup>19</sup> Frey, Patrice. (2007). *Measuring Up: The Performance of Historic Buildings Under the LEED-NC Green Building Rating System*. (Master's Thesis, University of Pennsylvania). Available from ScholarlyCommons University of Pennsylvania.

<sup>20</sup> Frey, Patrice. (2007). *Measuring Up: The Performance of Historic Buildings Under the LEED-NC Green Building Rating System*. (Master's Thesis, University of Pennsylvania). Available from ScholarlyCommons University of Pennsylvania.

sustainable building. There are some areas where LEED lacks acknowledgements of types of sustainability that the Living Building Challenge excels, and vice versa. The two, when compared, form a much more holistic sustainable framework.

The Living Building Challenge is also broken down into six categories: Site, Water, Energy, Health, Materials and Equity. The major difference between the Living Building Challenge and LEED NC is the inclusion of the “Equity” category.

Within the site category, adaptive reuse projects find themselves in a similar bind as they do under the LEED NC system. Sites of adaptive reuse projects are what they are with no flexibility. It would be purely coincidental if they met the mandates of the Living Building Challenge: built on a grey or brownfield and a certain distance from any sensitive ecological habitats. Equally as difficult to inject into an existing project is urban agriculture. Site credit 02, Urban Agriculture prescribes the percentage of project area that must be food production based on floor area ratio (FAR). Similar to the habitat credit in LEED NC, the Living Building Challenge mandates that for every hectare of development, an equal amount of land must be set aside as a wildlife habitat. Perhaps the most feasible for adaptive reuse projects is credit 04, Car-Free Living. As many historic adaptive reuse projects are in urban areas, they may coincidentally be conducive to this credit. The project must “contribute to the creation of walkable, pedestrian-oriented communities.”<sup>21</sup> All

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<sup>21</sup> International Living Building Institute. *Living Building Challenge 2.0*. 2010. Page 18.

occupancy types (residential, institutional, commercial and office) must surround the site.

Credit 05, Net Zero Water, is the first credit in the Water category. This credit calls for 100% of occupants' water to come from captured precipitation or a closed-loop water system. If a catchment system may be installed without compromising the aesthetic, mechanical or structural integrity, this is perhaps a possibility. Credit 06, Ecological Water Flow, mandates that 100% of storm water and building water discharge be managed onsite to feed the project's insular water demands, or released in to adjacent areas at an appropriate rate for drainage. This credit greatly increases to a building's individual sustainability, setting the bar that all water needs will be collected, treated and reused on the project site. Achieving this credit, depending on the condition of the existing facility and size of the lot, may be highly improbable for an historic property. This requires a fair amount of land for either a swale and runoff collection area or porous pavers/rain gardens/living systems or cisterns to treat the water on site.

Credit 07, Zero Energy, is the one and only of the energy credits. To achieve this credit, the project must be 100% supplied by on-site renewable energy on a net-annual basis.

Credit 08 marks the beginning of the "Health" credits. 08, Civilized Environment, mandates that all occupiable space have operable windows for equal

access to fresh air and daylight. This would be difficult in an historic property, given that the existing space is what you have to work with, regardless of its proximity to an exterior wall or skylight. Given the restrictions of an historic property and its designation, perhaps additional windows, skylights or solar tubes could be added. Credit 09, Health Air, monitors air quality by prohibiting smoking on the project's land, complying with high ventilation rates, and utilizing dirt track-in systems. Not only should this be achievable in adaptive reuse, but it is for the good of the occupants and their productivity and enjoyment of the space. And finally to create a healthy indoor environment, Credit 10, Biophilia suggests that environmental features, natural forms, patterns and processes and light and space be used to give human connection to natural systems.<sup>22</sup>

Building materials should be carefully evaluated in historic properties both to retain design integrity and purge of harmful chemicals. Credit 11, Red List, bans a list of 15 harmful materials and chemicals, including lead, mercury, PVC and asbestos, to name a few. The removal of these from an historic building is a sacrifice that preservations should make for the good of the building's future use. Credit 12, Embodied Carbon Footprint mandates that the project must account for its total embodied carbon footprint from construction through the life of its existence. While this credit may be difficult to measure in a building that has been standing for decades, no one can argue that it is more efficient in terms of carbon footprint and embodied energy to reuse an existing building rather than raze and building new construction.

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<sup>22</sup> International Living Building Institute. *Living Building Challenge 2.0*. 2010. Page 29.

Credit 13, Responsible Industry, must advocate for third-party standards for sustainable building materials by utilizing their products, including stone and rock, metal and wood.<sup>23</sup> For adaptive reuse projects, this credit might be appropriately utilized by implementing it only when new additions or materials are used in the project. Credit 14, Appropriate Sourcing, may prove difficult for historic buildings, although many tend to be in developed, dense urban environments. This credit specifies radiuses in which certain resources lie near a building. As this is a siting issue and the site of an historic building is set in stone, this credit will either be met or not by an historic property. Credit 15, Conservation + Reuse may be adapted to work well with an adaptive reuse project. A material conservation management plan must be in place for all phases of a project, from the design phase to the end of life phase. As adaptive reuse projects are all about reusing existing elements, the little waste that is produced could be easily managed by a plan.

The second to last category of the Living Building Challenge is the one that is most glaringly missing from the LEED rating systems: Equity. Credit 16, Human Scale + Human Places requires that spaces be designed in proportion to pedestrian interaction, rather than automobile interaction. There are maximum amounts allowed for paved areas and streets in relation to pedestrian spaces.<sup>24</sup> Again, the context of an historic structure is set in stone, for the most part. While they do tend to be in denser, more walkable urban cores, this matter may be out of the architect's control. According to Credit 17, Democracy + Social Justice, all primary transportation, roads

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<sup>23</sup> International Living Building Institute. *Living Building Challenge 2.0*. 2010. Page 32.

<sup>24</sup> International Living Building Institute. *Living Building Challenge 2.0*. 2010. Page 38.

and non-building infrastructure must be equally accessible to all members of the public regardless of background or socio-economic status. Credit 18, Access to Nature, similarly requires that a project cannot block access to fresh air, water or sunlight of anyone in the public realm or an adjacent development. Access to public and natural amenities must be equal opportunity.

The final category of the Living Building Challenge is Beauty. The first credit, number 19, Beauty + Spirit is emotional and aesthetic as it requires for design features that are made for human delight and the celebration of culture, spirit and place. What are historic preservation adaptive reuse projects if not the celebration of spirit, culture and place?! This credit seems to fit perfectly, given the preservationists' sensibility of beauty. Key to the future successes of a project may be found in the requirements of Credit 20, Inspiration + Education. "Materials informing the public of the performance and operation of the project must be provided to the public to share successful solutions and to motivate others to make change."<sup>25</sup> For the maintenance and future appreciation of a project, the education of the public is essential.

The prescriptions of the Living Building Challenge are quite strenuous but inevitably quite valuable for the good of our built environment, natural environment and society as a whole. There are many lessons that can be learned from them and implemented in a more socially-sensitive version of the LEED framework.

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<sup>25</sup> International Living Building Institute. *Living Building Challenge 2.0*. 2010. Page 43.

### 3.4 Conclusions

LEED for New Construction is blatantly lacking any support for socio-cultural sustainability, or encouragement for social equity in the building's community. The current LEED frameworks only address economic and environmental sustainability but this omission allows for LEED certified projects that, while helping their environment, do little to help their community and those living in it. A building cannot truly better its surroundings without touching the people and bonding the community. If sustainability means existing in the now and setting up for the future, this includes engaging the locals in a common cause for mutual betterment.



## CHAPTER 4: CASE STUDY – TATE MODERN

Two decades ago, London's South Bank was desolate, gray and grim. The old oil-fired Bankside Power Station was an enormous brown brick abandoned space that loomed over the Thames River. The area was completely devoid of people and was an inefficient use of such prime waterfront property.

After London experienced a series of power shortages in 1947, the Bankside Power Station was commissioned. Sir Giles Gilbert Scott, the designer of the Battersea Power Station and the Red Telephone Box, was awarded the project design. Construction work took place in two phases, the first (the western portion of the building) completed in 1952 at which point the building started generating power. The second phase was completed in 1963. The structure was divided in to three pieces – the main turbine hall at the center and a small boiler room and switching room on either side. The station utilized four oil-fired generators, which inevitably proved to be its downfall when oil became economically inefficient in the 1970s and 80s. The plant closed in 1981.



**Figure 4: Bridge across Thames River to Tate Modern. Photo by Author.**

In 2001, the Bankside Power Station became the Tate Modern. After a long campaign during the 1990s to save the building, the Tate Gallery finally purchased it. Bankside was inevitably selected (over its sister plant Battersea Power Station) because it was in better condition and was a more appropriate (smaller) size for a gallery. The building in its raw form was 660 ft long and roughly 100 ft high, made of a steel frame and brick cladding. By far the highest point is the chimney at 325 feet.

Tate Gallery project architects Herzog and de Mueron achieved one of the greatest and most famous examples of adaptive reuse in our modern world. The



**Figure 5: Turbine Hall, Tate Modern. Photo by Author.**

project sets an example of historic preservation, urban renewal and sustainable development. While the project is a beacon for what may be achieved through

adaptive reuse, it did not come without difficulty. As the plant was oil-fired, nearly 20% of the entire construction budget was consumed by removing the toxic chemicals.<sup>26</sup> Another great challenge inherent when dealing with a power plant site was its relative inaccessibility that had to be overcome, as well as the difficulty of placing urban, human-scale program in to spaces that were never intended to house it.



**Figure 6: Tate Modern meets Thames River. Photo by Author.**

Perhaps the most prominent feature of both the Bankside Power Station program and the Tate Modern program is the Turbine Hall. This cavernous space (500 ft long by 115 ft tall) once housed the primary pieces of power generation equipment and now serves as a very grand entrance hall to the Tate museum. The space has been left largely untouched with any alterations attached on to the wall in an obvious contrast to the existing fabric. The entrance hall remains empty and a

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<sup>26</sup> “Designing the Tate Modern.” About Architecture. Web. 16 May 2011.  
<<http://architecture.about.com/od/museum1/ss/TateModern.htm>>

powerful testament to the scale of the Bankside Power Station the majority of the time. Occasionally, large-scale sculptural art pieces share the entrance hall with the gallery visitors.<sup>27</sup>



**Figure 7: Turbine Hall filled with sunflower seed exhibit. Photo: BBC News.**

The Boiler House along the side of the Turbine Hall became the official home of the Tate Galleries. The exhibits run the entirety of the length at the building and there are three floors of exhibits. Two of the floors are permanent collections of modern art while the third is for temporary exhibits. A new addition (one of the few) to the Bankside Power Station building is the glass box that runs along the length of the building. This two-story glass penthouse is known as the “lightbeam.”<sup>28</sup> Rising above the roofline, it is iconic in the London skyline and can be seen for miles. The top levels house restaurants and a member’s-only room. Another addition that added

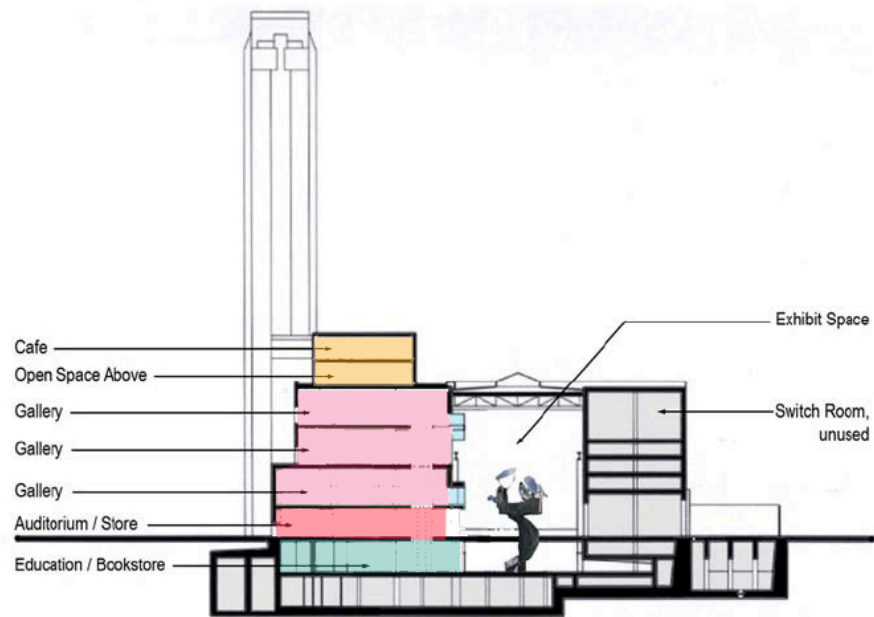
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<sup>27</sup> “Tate Modern: The Building.” Online Tate. Web. 16 May 2011.  
<<http://www.tate.org.uk/modern/building/>>.

<sup>28</sup> “Tate Modern: The Building.” Online Tate. Web. 16 May 2011.  
<<http://www.tate.org.uk/modern/building/>>.



to the iconic presence of the Tate Modern in the Swiss Light placed by artist Michael Craig-Martin at the top of the chimney.



**Figure 8: Tate Modern Section.**



**Figure 9: Tate Modern basement. Photo: “Designing the Tate Modern.”**

Oil-fired plants come with a great deal of square footage, the majority of it below grade. Herzog and de Mueron were also challenged with the task of programming the cavernous below ground oil-storage areas of the Bankside Power Plant. The spaces have been slated for auditoriums, performance areas and movie theatres.

One of the most important contributions the adaptive reuse of the Tate Modern has had on the community is the revitalization of the Thames waterfront. It has sparked considerable surrounding development and completely reactivated the pedestrian use of the waterfront.

The original design for the Tate Modern utilized glass as the primary exterior cladding. This initiated the discussion about the building's sustainability. The glass was substituted for perforated brick, allowing the skin to breathe and naturally ventilate while also allowing light in. A new addition coming in time for the 2012 Olympics harvest heat from EDFE transformers to reduce energy consumption by 54% and carbon footprint by 44%.

As the Seaholm Power Plant (built a mere 4 years after the Bankside Power Station) was also oil-fueled and river-front, the two have many of the same issues regarding site remediation and best possible use of the site, including utilizing the waterfront to its best possible manner. Herzog and de Mueron's treatment of the turbine hall as a dramatic flex space is commendable. It produces an affect that is impossible to achieve in new construction as it would most certainly be cut in efforts of value engineering. Herzog and de Mueron make the most of the available raw spaces to create the building as a work of art.

## CHAPTER 5: CASE STUDY – MILLER’S COURT

The Miller’s Court Development in Baltimore is both an industrial adaptive reuse project and an example of how sustainable initiatives can be used to improve the community as well as the environment. This makes it an ideal selection for a precedent for the Seaholm Power Plant adaptive reuse project.



**Figure 10: Miller's Court. Photo: Tom Liebel, MarksThomas Architects.**

The Miller’s Court building was constructed in 1874 for the H.F. Miller and Son’s Tin Box and Can Manufacturing Company. Located at 2601 N. Howard Street in Baltimore, the facility manufactured cans for the American Can Company until the 1990s. The building is 77,000 square feet and constructed of brick. The original construction in the late 1800s was a 4-story “L” shaped building and in 1910, a 3-story brick addition was added. Later, in 1928, a 2-story brick stable was added. This building is significant to the residents of Baltimore because it represents an era

in the city's industrial history.<sup>29</sup> In the late 19<sup>th</sup> century, the company was one of the largest manufacturers of tin boxes in the United States and the facility on Howard Street was, at the time, state-of-the-art and utilized new mechanization that greatly improved the can industry. In 1953, the company ceased operations at the Miller factory building. In the following years, the building was subdivided in to spaces for a number of companies and was leased by various local businesses until 1990 when the U.S. Census Bureau headquartered in the space during the 1990 survey. Since the completion of the 1990 census, the building has been vacant.



**Figure 11: Interior of Miller's Court Project.**  
Photo: Tom Liebel, MarksThomas Architects.

In the early 2000s, the Seawall Development Company saw an opportunity to do well in the community by utilizing the old building. Donald Manekin of Seawall wanted to help the Baltimore School system and believed that he could do so by creating a supportive environment for local Teach for America participants. Fostering the social development of the teachers (who

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<sup>29</sup> "Behind the Scenes Tour of Miller's Court." Baltimore Heritage. Web. 16 May 2011.  
<<http://www.baltimoreheritage.org/2011/04/behind-the-scenes-tour-of-millers-court/>>



frequently complain of being isolated during their stint in the program) is inevitably mutually beneficial for both the students and the teachers.<sup>30</sup>

The choice of location for this project was obvious. The Miller & Sons Tin Box and Can Manufacturing Plant was near the headquarters of the Baltimore City Public Schools, in an up-and-coming neighborhood and 4 blocks from the Johns Hopkins University School of Education. Because of savings by historic preservation tax



**Figure 12: Courtyard at Miller's Court. Photo: Tom Liebel, Marks Thomas Architects.**

credits (the facility was nominated to the National Register of Historic Places in 2003) and enterprise zone credits, the structure could be economically redeveloped as a mixed-use facility seeking LEED Gold certification. But Seawall Development Corporation and architects of Marks, Thomas Architects sought to go a step beyond the normal LEED criterion – they focused more on socio-cultural sustainability, or social equity.

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<sup>30</sup> “Baltimore Rehab: Socially Responsible Development.” National Trust for Historic Preservation. Web. 16 May 2011. <<http://www.preservationnation.org/main-street/main-street-news/2009/04/baltimore-rehab.html>>

Out of the buildings total square footage, 35,000 square feet have been allotted as offices for non-profit groups while 40,000 have been designated as below-market rate apartments for the Teach for America students. This project is socially sustainable because the groups of people that will be utilizing the Miller's Court space are generous with their own personal resources and time. This project is a way of giving a bit back to them, as a thank you. And because the fortunate building occupants are philanthropists, this community will continue to pay it forward. A key to socio-cultural sustainability is to allow people to interact with one another, without forcing them to socialize. The developers and architect sought to create public spaces where the teachers might engage each other, make friends, and compare ideas for their classrooms.

Everywhere they could, Marks, Thomas Architects reused any existing building elements. This included any existing materials and the building's natural amenities, including its access to natural light and ventilation. Outdoor space was limited so it was capitalized upon by creating an inner courtyard that is meant to encourage all tenants (non-profit workers and teacher residents) to interact outside. Where they once loaded tin cans on to trucks at the loading dock there is now a fire pit and bocci ball court. The large metal industrial doors and original heavy timber structure are still integral elements in the new building. While the industrial doors are now purely for aesthetic use, the beautiful heavy timber was repaired where necessary to remain a viable, hearty structure that provides the structural support for the building.

Beyond the bricks and mortar, this project goes further in striving to create a nurturing environment that will improve the community far more than typical LEED certified projects. This building will serve as an icon of generosity, public service, education and heritage. The greater Baltimore community will be improved from the social projects that will pour out of this new nonprofit think-tank environment. It is not simply the beautiful reuse of architecture that should be admired here. The integration of community contribution and historic architecture form an admirable precedent.

## CHAPTER 6: SUSTAINABILITY

### 6.1: Sustainability

What is sustainability? Across disciplines or even within the discipline of architecture, it can take on a variety of meanings. How one defines sustainability affects building design, as well as how the green building rating system is framed. Understanding what sustainability means is critical for forming a sustainable building.

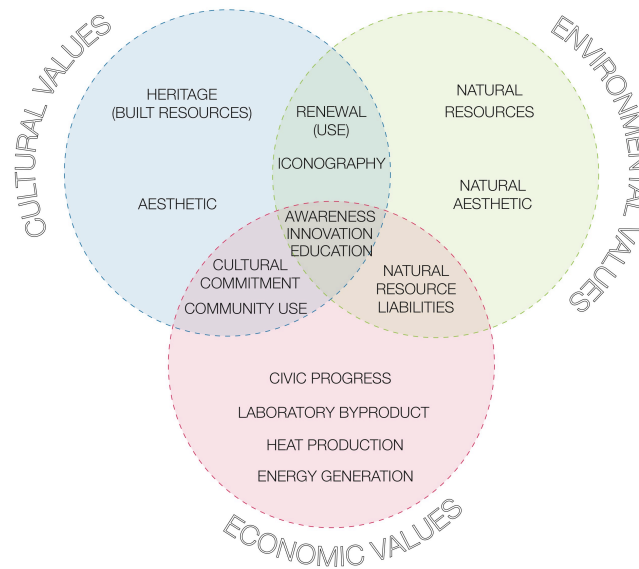
What does sustainability mean? It is the capacity to endure. It is the ability to be used, without the permanent depletion of resources.<sup>31</sup> Sustainability is holistic, cyclical and meets both present and future needs. An object that is sustainable is self-sufficient and regenerative. For our built environment to be sustainable, it must have the capacity to endure. What characteristics, then, does a building need to fit this bill? True sustainability needs to have socio-cultural, economic and environmental components. Without specific qualities from each prong, it would not be truly sustainable.

For a project to be truly sustainable, it must embody values from three separate but essential spheres of values. Economic, environmental and cultural

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31 "Sustainable." Webster's Dictionary. Web. March 24, 2011. <<http://www.merriam-webster.com/dictionary/sustainable>>.

(socio-cultural sustainability/social justice) are equally essential values that a sustainable project must embody.



**Figure 13: Value sphere for sustainable design. Graphic by Author.**

While the particular embodied values may vary in each sphere depending on the project and its history (this value sphere was created for use on industrial adaptive reuse), the premise that these spheres overlap to create an innovative and educational experience for all involved.

## 6.2: Inherent Sustainability of Historic Properties

As aforementioned, there are three overarching categories of sustainability: economic, environmental and cultural. Cultural sustainability is, in my opinion, the element of the three where historic preservation projects can do the most good. For a

piece of our built environment to endure and last for generations, it must be beloved and appreciated in the community. Locals must feel a connection to this place and must have an interest in seeing it well utilized in the future. Historic properties have an existing advantage on this front in each community. They have proven their value in a community and have a preexisting physical and emotional presence. They therefore have a greater capacity for being an integral part of the culture of future communities and will therefore be maintained to a better level in the future.

### 6.3: LEED for Historic Properties

Historic properties are naturally quite sustainable, and yet struggle to meet current green building rating system criteria, LEED for NC in particular. Given my understanding of the current LEED rating systems and the treatment and current conditions of our nation's historic structures, I would like to propose options for credits for a LEED for Historic Properties rating system, which would capitalize on potential inherent sustainability characteristics that historic buildings possess, and credits that are achievable within the guidelines set by the Secretary of the Interior's Standards.

Based on previous analysis, the credits that would remain identical to the LEED for New Construction rating system list as follows: SS P1, 1, 2, 3, 4.1, 4.2, 4.3, 4.4, 8 and 9, W P1, 1.1, 1.2, 2, 3.1, and 3.2, EA P3, 2.3, 3, 4, 5 and 6, M P1, 1.1, 1.2, 2, 3, 4, 5, 6 and 7 and IEQ P1, P2, 1, 2, 3.1, 3.2, 4.1, 4.2, 4.3, 4.4, 6.1, 6.2, 7.1, 7.2,

8.1 and 8.2. New credits will be added to this rating system to capitalize on inherent sustainable characteristics of historic buildings, the first of which may be found under Sustainable Sites. This new credit, “Historic Buildings & Fabric” was adapted from the LEED Neighborhood Development framework. This credit requires that designated historic buildings or cultural landscapes in the immediate vicinity are not demolished or altered without permission of the governing authority. A certificate of appropriateness from said governing body would be a piece of the submission necessary to obtain this credit. A new credit added to the Energy & Atmosphere category of LEED HP is “Avoided Impact.” While this credit would be difficult to quantify, it is well known through recent studies that the carbon footprint required to demolish and rebuild a structure requires a 40-60 turnaround for even the most technologically savvy building to neutralize its impact. The Avoided Impact credit recognizes that by reusing an historic structure, there is a tremendous avoided carbon footprint. Rough calculations of impact avoided should be included for submission for this credit. In the Materials and Resources category, “Historic Integrity in Materials and Building Layout” ensures that reuse is done tastefully not only to protect the environment but to protect original feel and sentiment of the building. Percentages of materials reused for their original purpose and building layout retained should be quantified and filed to obtain this credit. Greater percentages of historic integrity protected might result in higher point totals awarded.

The greatest difference between LEED HP and LEED NC is the addition of the Social Justice and Equity category. This new heading has 4 credits for which a

project might earn points. The first, “Inspiration and Education” emphasizes the importance of improving the local community. The building must serve to teach visitors about sustainable initiatives, history, culture or a multitude of other positive subjects to obtain the points. To submit for this credit, an architect should provide specific descriptions of educational exhibits and how they are presented to the public (a public that encompasses all walks of life). The second credit is “Community Engagement.” The aforementioned educational initiatives are only successful if the community is invested and involved with the building. This credit is also essential for a historic building to maintain its relationship with the local people. A plan to foster a long term relationship between the community and its historic relic is essential for the building’s longevity and future status. A marketing plan for the long-term protection and involvement with this building should be submitted to achieve this credit. Credit three is “Culturally Appropriate.” A successful adaptive reuse requires the new building use to be appropriate given the building’s history, original use and the community in which it sits. The final credit has a direct, quantifiable positive affect on the community. Credit 4, “Job Creation” insists upon the creation of jobs through the adaptive reuse and subsequent operations of the building. Encouraging specialization and trade employment in the building is positive, and submissions should include estimated number of opportunities during construction, their field of expertise and duration, as well as opportunities post construction and their fields of expertise and duration. This credit would most likely require a follow-up after 1 year of building occupancy.



## LEED for Historic Properties Project Checklist

A set of criteria for historic preservation adaptive reuse projects

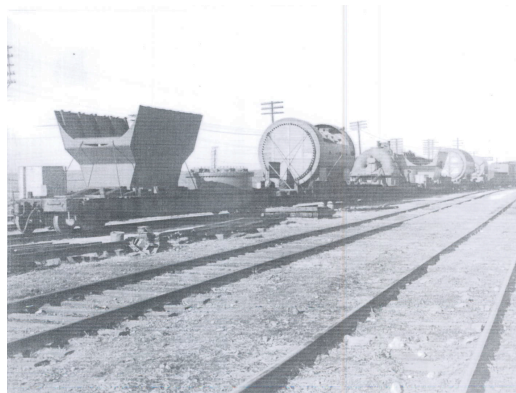
Sustainable Sites		
<b>Prereq 1</b>	Construction Activity Pollution Prevention	✓
<b>Credit 1</b>	Site Selection	✓
<b>Credit 2</b>	Development Density and Community Connectivity	✓
<b>Credit 3</b>	Brownfield Redevelopment	✓
<b>Credit 4.1</b>	Alternative Transportation - Public Transportation Access	✓
<b>Credit 4.2</b>	Alternative Transportation - Bicycle Storage and Changing Rooms	✓
<b>Credit 4.3</b>	Alternative Transportation - Low Emitting and Fuel Efficient Vehicles	✓
<b>Credit 4.4</b>	Parking Capacity	✓
<b>Credit 8</b>	Light Pollution Reduction	✓
<b>Credit 9</b>	Natural Eco-system Restoration	✓
<b>Credit N1</b>	Reuse of Historic Buildings & Fabric (LEED ND credit)	✓
Water Efficiency		
<b>Prereq 1</b>	Water Use Reduction	✓
<b>Credit 1.1</b>	Water Efficient Landscaping, 50%	✓
<b>Credit 1.2</b>	Water Efficient Landscaping, 100%	✓
<b>Credit 2</b>	Wastewater Technologies	✓
<b>Credit 3.1</b>	Water Use Reduction, 20%	✓
<b>Credit 3.2</b>	Water Use Reduction, 30%	✓
Energy & Atmosphere		
<b>Prereq 3</b>	Fundamental Refrigerant Management	✓
<b>Credit 2.3</b>	On-Site Renewable Energy	✓
<b>Credit 3</b>	Enhanced Commissioning	✓
<b>Credit 4</b>	Enhanced Refrigerant Management	✓
<b>Credit 5</b>	Measurement and Verification	✓
<b>Credit 6</b>	Green Power	✓
<b>Credit N1</b>	Avoided Impact	✓
Materials and Resources		
<b>Prereq 1</b>	Storage and Collection of Recyclables	✓
<b>Credit 1.1</b>	Building Reuse - Maintain Existing Walls, Roof and Floor, 75-100%	✓
<b>Credit 1.2</b>	Building Reuse - Maintain Existing Interior Nonstructural Elements	✓
<b>Credit 2</b>	Construction Waste Management, Divert 50-75%	✓
<b>Credit 3</b>	Materials Reuse, 5-10%	✓
<b>Credit 4</b>	Recycled Content, 10-20%	✓
<b>Credit 5</b>	Regional Materials, 10-20%	✓
<b>Credit 6</b>	Rapidly Renewable Materials	✓
<b>Credit 7</b>	Certified Wood	✓
<b>Credit N1</b>	Historic Integrity in Materials and Building Layout	✓
Interior Environmental Quality		
<b>Prereq 1</b>	Minimum IAQ Performance	✓
<b>Prereq 2</b>	Environmental Tobacco Smoke Control	✓
<b>Credit 1</b>	Outdoor Air Delivery Monitoring	✓
<b>Credit 2</b>	Increased Ventilation	✓
<b>Credit 3.1</b>	Construction IAQ Management, During Construction	✓
<b>Credit 3.2</b>	Construction IAQ Management, Post Occupancy	✓
<b>Credit 4.1</b>	Low-Emitting Materials, Adhesives & Sealants	✓
<b>Credit 4.2</b>	Low-Emitting Materials, Paints & Coatings	✓
<b>Credit 4.3</b>	Low-Emitting Materials, Carpet Systems	✓
<b>Credit 4.4</b>	Low-Emitting Materials, Composite Wood & Agrifiber Products	✓
<b>Credit 6.1</b>	Controllability of Systems - Lighting	✓
<b>Credit 6.2</b>	Controllability of Systems - Temperature	✓
<b>Credit 7.1</b>	Thermal Comfort - Design	✓
<b>Credit 7.2</b>	Thermal Comfort - Verification	✓
<b>Credit 8.1</b>	Daylight & Views, Daylight in 75% of Spaces	✓
<b>Credit 8.2</b>	Daylight & Views, Views for 90% of Spaces	✓
Social Justice and Equity		
<b>Credit 1</b>	Inspiration & Education	✓
<b>Credit 2</b>	Community Engagement	✓
<b>Credit 3</b>	Culturally Appropriate	✓
<b>Credit 4</b>	Job Creation	✓

Figure 14: LEED for Historic Properties Checklist. Graphic by Author.

## CHAPTER 7: CITY OF AUSTIN

### 7.1 City of Austin History

The city of Waterloo was founded on the banks of the Colorado River in the early 1830s. In 1839, it was named the capital city of the independent Republic of Texas because of its central location and was renamed in honor of Stephen F. Austin, “the father of Texas.” With the presence of the state government, the Missouri Pacific railroad and, in 1883, the founding of the University of Texas, the city grew. For the majority of the nineteenth century, Austin was a railroad depot town. The population catered to the travelers that wandered in and out of Austin and the downtown warehouse district became a seedy underbelly. Throughout the twentieth century the city continued to evolve. With the presence of David Rodriguez and Willie Nelson in the 1970s, the music scene that Austin is now notorious for began to emerge on the national stage. Austin culture has really evolved in the last 40 years to embrace the indie music scene.



**Figure 15: 1930s Warehouse District in Austin centered around MoPac Railroad. Photo: Austin History Center.**

In recent years, the city of Austin's slogan has been "Keep Austin Weird." This mentality is embraced and perpetuated by its ever-burgeoning population of residents. The population is highly diverse and is known for its cultural life and the high-tech innovations that the large University of Texas brings to the city.<sup>32</sup> Today, Austin is a mid-sized city of 812,000 people over 307 square miles.<sup>33</sup> State demographers project that by 2020, it will be home to roughly 950,000 individuals.

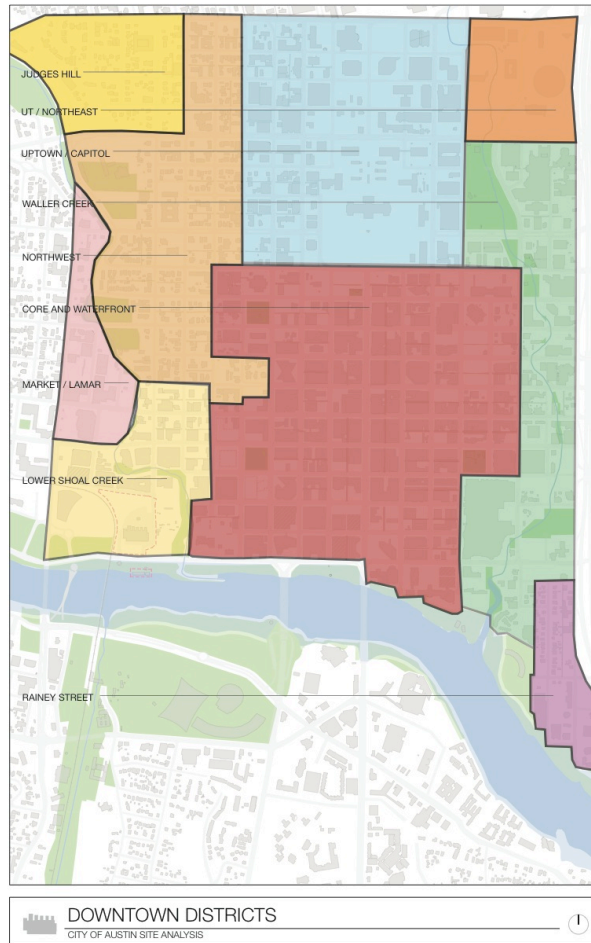
## 7.2: Context Analysis

Downtown Austin is comprised of 7 districts. The Seaholm Power Plant is located in district 5, the Lower Shoal Creek District in the southwest corner of downtown.

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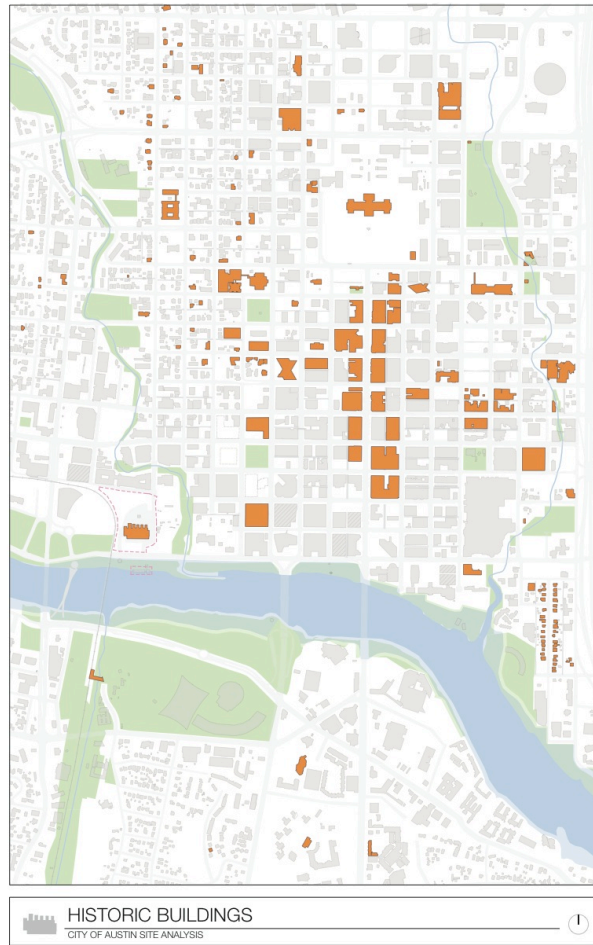
<sup>32</sup> "Our Community's Collective Memory." Austin History Center. Web. 24 March 2011. <<http://www.ci.austin.tx.us/library/ahc/briefhistory.htm>>.

<sup>33</sup> "Demographics." City of Austin. Web. March 24, 2011. <<http://www.ci.austin.tx.us/demographics/>>.

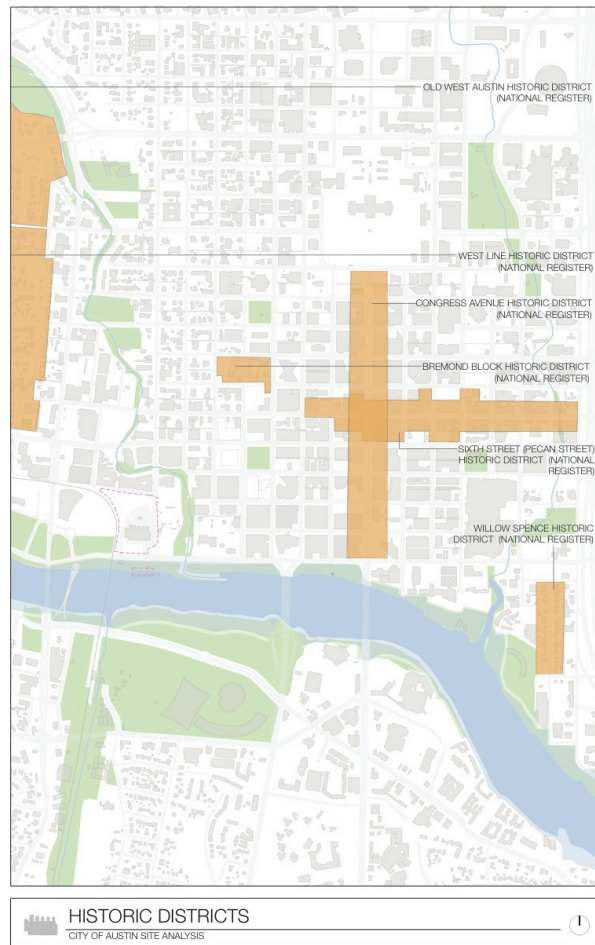


**Figure 16: Downtown Austin Districts. Graphic by Author.**

Downtown Austin has two National Register historic district areas. The Seaholm Power plant does not fall in these districts, but is adjacent. Aside from the downtown historic districts (and proposed or eligible areas), the downtown area contains many state and nationally recognized historic buildings.



**Figure 17: National Register Historic Buildings in Austin. Graphic by Author.**



**Figure 18: Historic Districts in Downtown Austin. Graphic by Author.**

### 7.3: Zoning

The City of Austin utilizes zoning regulations to organize its built environment. While the committee that oversees the downtown redevelopment will more specifically monitor the Seaholm site and its proposed uses, it must also abide by standard regulatory laws. The Seaholm Power Plant site falls under two types of Zoning Site Development Standards: L District and CR District.

**L District – Lake Commercial**

Minimum Lot Size (square feet)	5,750
Minimum Lot Width	50 ft
Maximum Height	200 ft
Minimum Setbacks	
Front Yard	10 ft
Street Side Yard	10 ft
Interior Side Yard	-
Rear Yard	-
Maximum Building Coverage (of lot)	50%
Maximum Impervious Cover (of lot)	50%
Maximum Floor Area Ratio	8:01

**CR District – Commercial Recreation**

Minimum Lot Size (square feet)	20,000
Minimum Lot Width	100 ft
Maximum Height	40 ft
Minimum Setbacks	
Front Yard	50 ft
Street Side Yard	50 ft
Interior Side Yard	20 ft
Rear Yard	20 ft
Maximum Building Coverage (of lot)	25%

Maximum Impervious Cover	60%
Maximum Floor Area Ratio	0.25:01

**Parking Requirements (as dictated by the city)**

Personal Services	1 space/275 sq ft
Indoor Sports and Recreation	1 space/500 sq ft

Depending on the building program selected, the current square footage of the Seaholm Power Plant will require about 220 parking spaces.

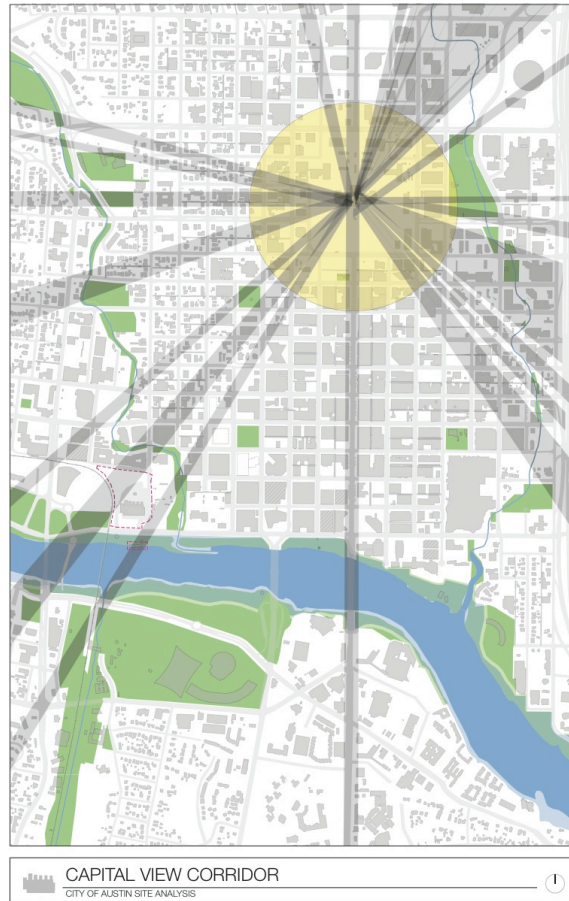
#### 7.4 Legal Requirements

In addition to the regular zoning, the Seaholm Property also falls within a CVC District – the Capitol View Corridor District. The CVC District regulations mandate that areas within specific corridors of the city which have been selected as “significant, publicly accessible views of the State Capitol Building of Texas” be kept clear of tall buildings.<sup>34</sup> This district essentially protects the public’s right to views of the state capitol, and preserves these within the city. On the Seaholm site in particular, the majority of the northwest quadrant of the site must be under two stories tall.

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<sup>34</sup> “Zoning Districts.” City of Austin. Web. 5 July 2011. <  
[http://www.ci.austin.tx.us/zoning/zoning\\_districts.htm](http://www.ci.austin.tx.us/zoning/zoning_districts.htm)>.





**Figure 19: Capitol View Corridors, Downtown Austin. Graphic by Author.**

Further, as a Recorded Texas Historical Landmark, the Texas Historical Commission must approve any proposed changes that would affect the exterior of the building.

The property owner, in this case, Austin Energy, must give at least 60 days notice of proposed alterations.<sup>35</sup>

## 7.5 Land Analysis

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<sup>35</sup> Interview with Caroline Wright, THC. March 1, 2011.

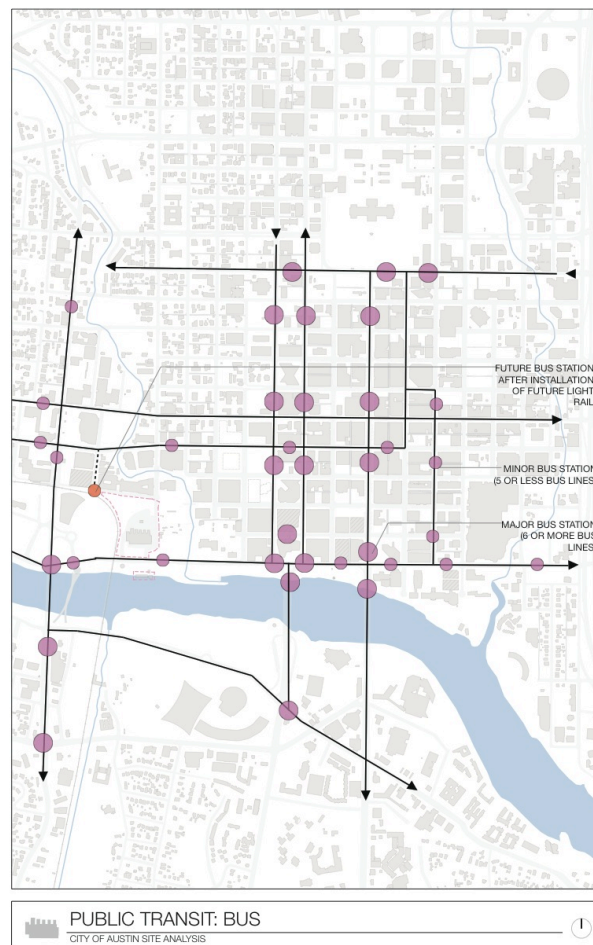


**Figure 20: Seaholm District Topography. Graphic: City of Austin.**

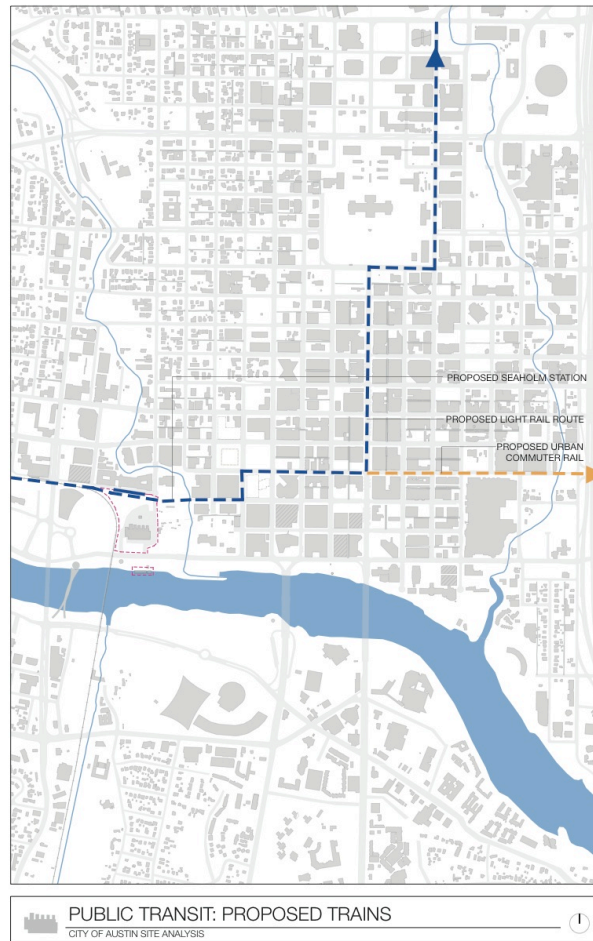
Austin is located in Central Texas, which has some of the most complex topography in the state. It is part of an area known as the “Hill Country,” and has, in places, some of the state’s most significant grade changes. To the north of the Seaholm Power Plant in the heart of downtown Austin, the ground is relatively flat. Shoal Creek running east and north of Seaholm displays roughly a 30-foot drop between highest and lowest elevation. The elevation change between the front steps of Seaholm and Town Lake is similar. There is a drop of 34 feet between the building and the waters’ edge, which becomes more severe with closer proximity to the water. Obviously the grade change is suspended as Cesar Chavez Road bisects the land. The Seaholm Plant pumping station on the shores of town lake utilizes the steep grade change by entering on the second level (north side of the building) and engaging the lake on the first level (south side of the building).

## 7.6 Movement Analysis

Downtown Austin is extremely well connected by public transportation, and will only become more so in the next 20 years. Currently, about a dozen bus lines zigzag through downtown, including around the Seaholm site. The “Dillo,” a bus-shaped-as-trolley line also circles downtown only. As part of the 2025 master plan, Austin will be adding a new light rail that will come in from the west and stop at the new Seaholm Station, before moving east to Congress Street and travelling north to the Capitol building.



**Figure 21: Downtown Austin Bus Routes. Graphic by Author.**

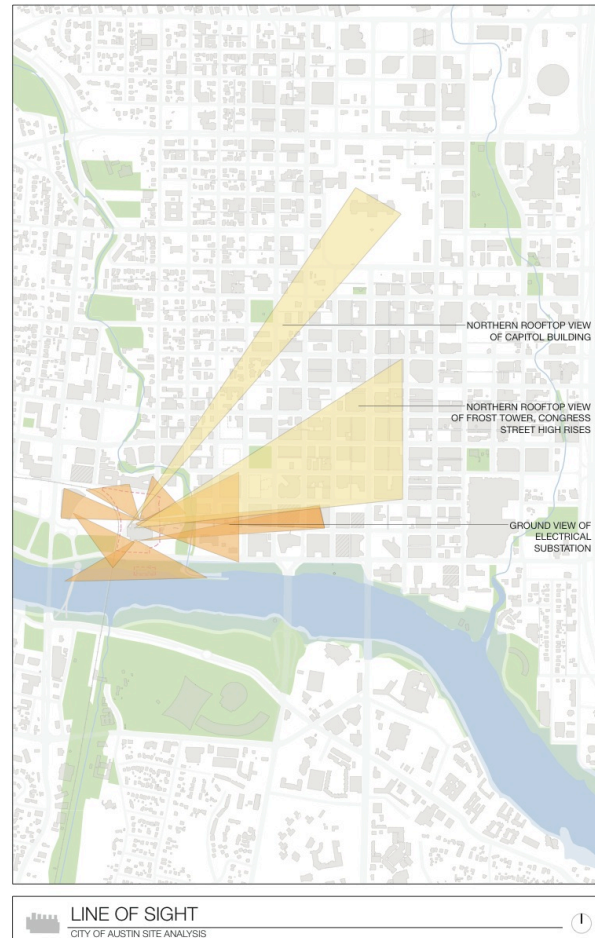


**Figure 22: Proposed Light Rail Path. Graphic by Author.**

## 7.7 Sensory Analysis

The Seaholm Power Plant, while slightly marooned on such a large piece of land, is in a very vibrant and active part of Austin and has the potential for meaningful connections with many parts of the city. Notably, the Austin City Hall is three blocks to the east, the Long Center for the Performing Arts facing the Seaholm Pumping Station from the south bank of Town Lake, the Lamar Boulevard

Commercial center is just northwest and, arguably most importantly, the state government seat is just up Congress Avenue 1 mile northeast.



**Figure 23: Lines of Sight from Seaholm to Downtown Austin. Graphic by Author.**

While there are many notable buildings nearby, the visual connection is not always there. With the Long Center for the Performing Arts, there is a visual connection between the Seaholm Plant and the Long Center, and especially between the Pumping Station and the Long Center. The visual connection between the two varies in different seasons, as in the warmer months the thick foliage along the banks of Town Lake occludes the view. An auditory connection remains year-round. The Long



Center frequently has events that spill on to their lawn and the sound travels. The residential units north and west of the site enjoy a mostly uninterrupted view of the plant – and certainly a view of its smoke stacks. The views from Seaholm primarily face south, so the views here are minimal.

Perhaps the strongest and most intriguing connection is between the Power Plant and the Pfluger Pedestrian Bridge.



**Figure 24: Photo of Seaholm Power Plant from Pfluger Bridge. Photo by Author.**

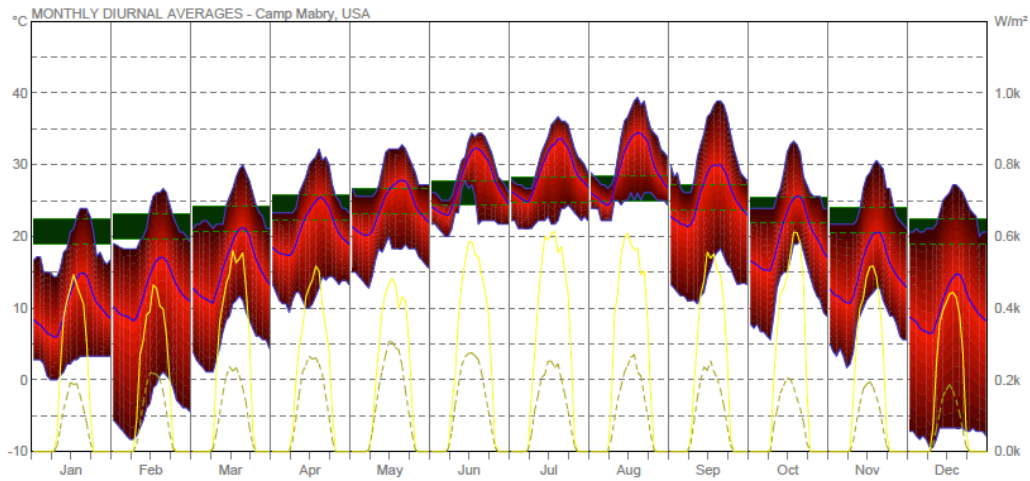
The Power Plant is quite intriguing and definitely a destination point from the bridge, as seen in the above photo.

## 7.8 Climate analysis

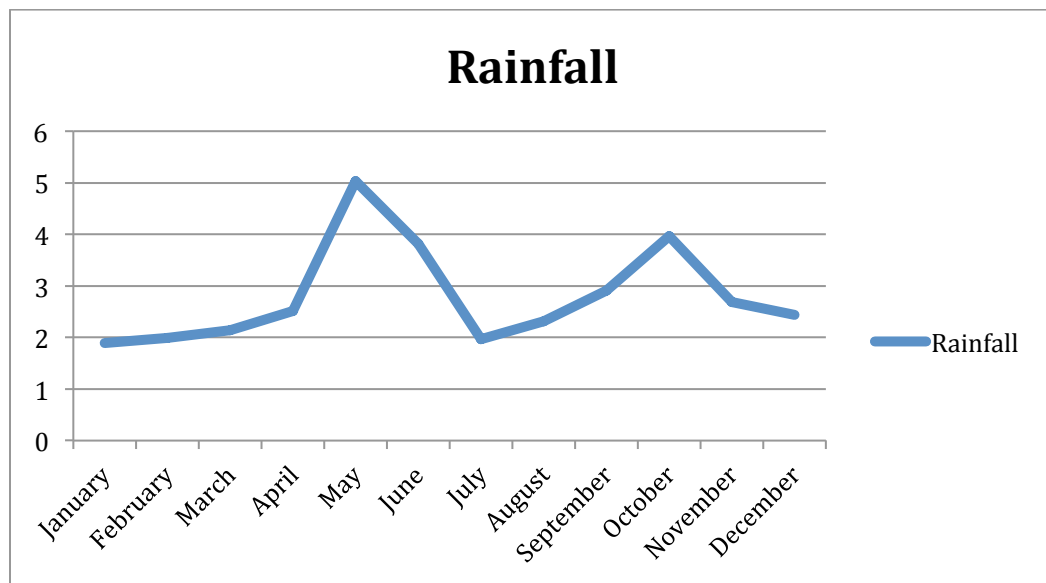
True to its central Texas location, Austin weather is very temperate. In winter, average lows rarely dip below 20 degrees Fahrenheit with temperatures between

November and February occasionally reaching as high as 80 degrees. The average temperature lies in the middle at around 55 degrees. In the summer the air is hot and dry, with temperatures ranging from 68 to 104 degrees with a humidity level of 30-70%.<sup>36</sup>

**Table 1: Austin, TX Average Temperatures. Graphic by EcoTect.**



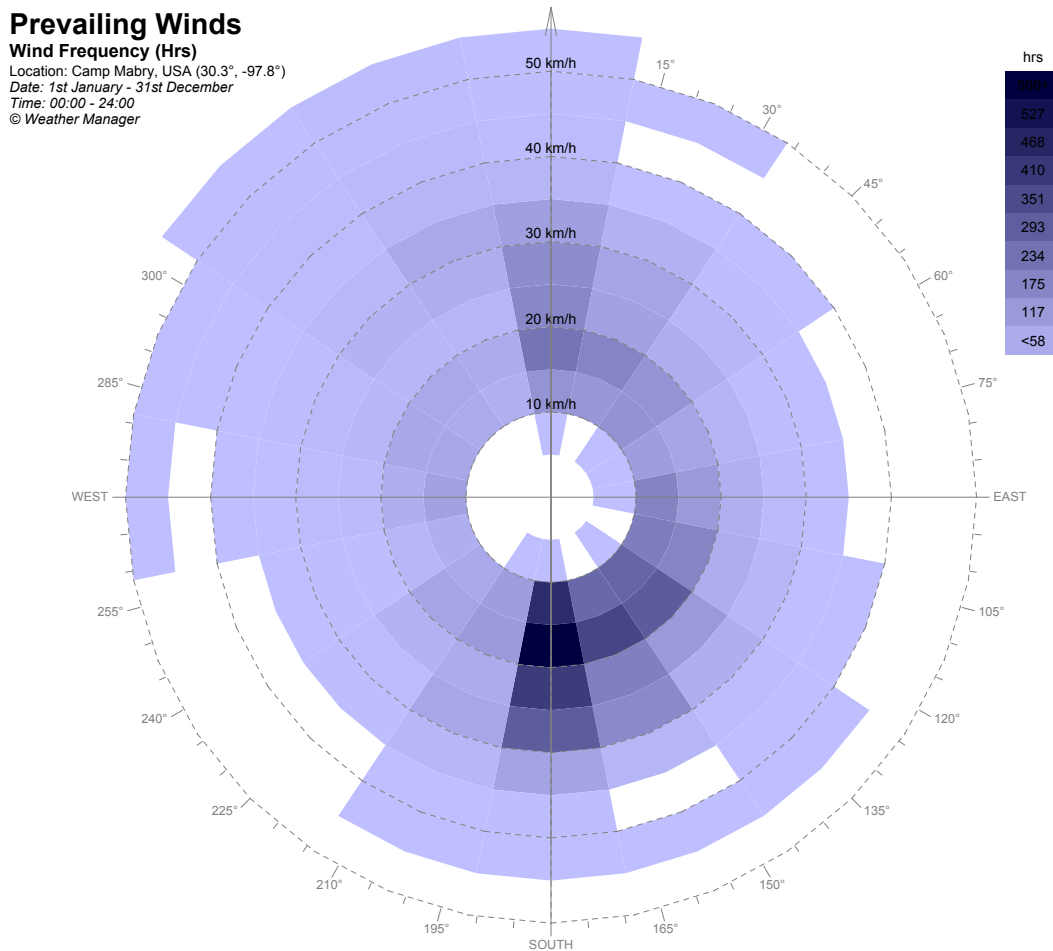
**Table 2: Austin, TX Average Rainfall. Graphic by Author.**



<sup>36</sup> "Austin." *EcoTect* (2010): n.pag. Database. 13 March 2011.

The above rainfall data is a years' average, in inches.<sup>37</sup> Snowfall is extremely rare, with trace amounts of accumulation, when it does fall at all.

Wind patterns are generally predictable, with the most common direction being a southern to southeastern wind. Winter winds range anywhere between the northwest and northeast spectrum, as may be seen in the figure below, obtained from EcoTect software measuring winds at Camp Mabry in Central Austin.

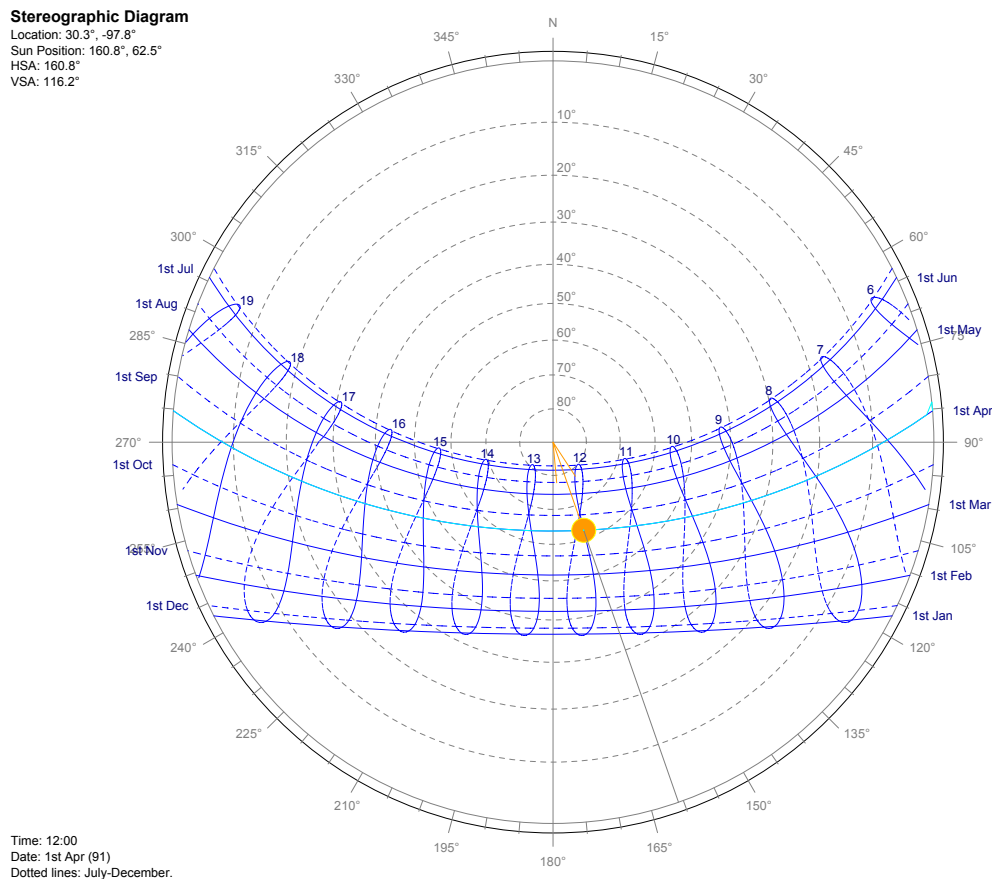


**Figure 25: Austin, TX Prevailing Winds. Graphic by Ecotect.**

<sup>37</sup> "Average Rainfall for the City of Austin." RSS Weather. Web. 13 March 2011.  
<<http://www.rssweather.com/climate/Texas/Austin%20City/>>.



The following sun path diagram shows that the sun is quite high in the sky in the summer – almost directly overhead. Between April and September the sun moves between 70 and 85 degrees in the sky. The sun is at its lowest point in winter (December, January) when it moves between 30 and 40 degrees above the horizon.



**Figure 26: Austin, TX Sunpath Diagram. Graphic by Ecotect.**

## 7.9 City of Austin Sustainability

In a state that consumes the most amount of energy nation wide and is home to big oil, Austin is a progressive beam of light in the movement to become more environmentally friendly. In 1991, Austin paved the way for all other American

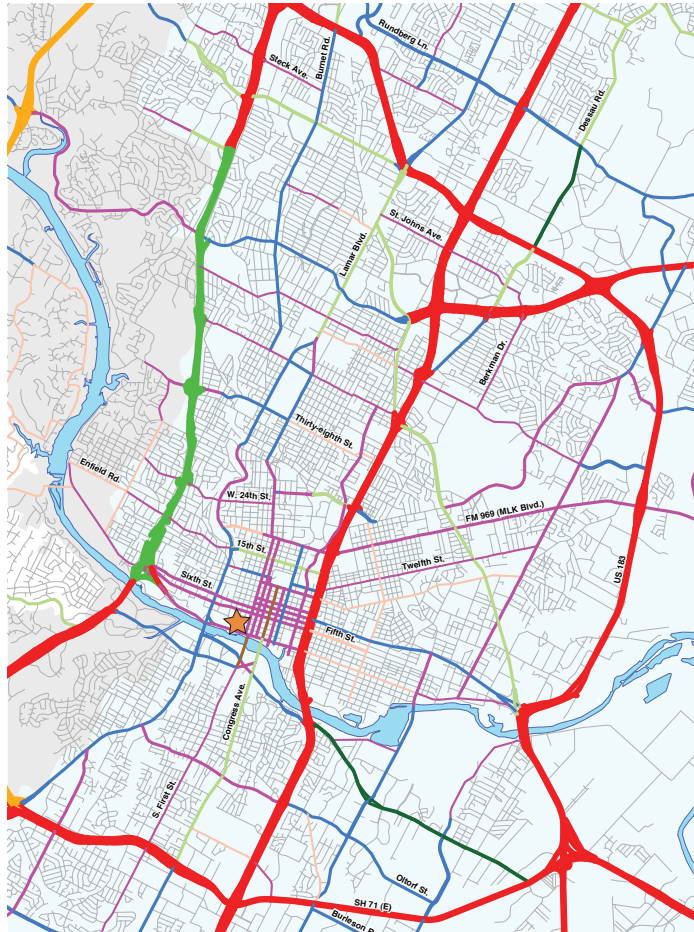
cities by establishing a local Green Building Program. This initiative started in 1985 with an awareness of Energy Star technology in a new power plant that the city was constructing. With the construction of the new plant, the city of Austin closed a chapter by decommissioning the Seaholm Power Plant, closing the door on less environmentally friendly power. For their efforts in a cohesive citywide environmental initiative, Austin won an award for their local government initiatives at the 1992 United Nations Earth Summit in Rio de Janeiro. Austin has continued to be a pioneer amongst United States cities in their sustainable efforts.

In 2007, the City of Austin implemented the Austin Climate Protection Program. This five-prong program will greatly reduce the environmental impact of the city on the world's natural resources. The program will make all city facilities, vehicles and operations carbon-neutral by the year 2020, increase energy efficiency of all city facilities, as well as expand energy conservation and use of renewable energy, and make all new electricity-generation carbon neutral. The plan will also update the building code to require that all new buildings be the most energy efficient in the nation, and implement community measures to get all Austinites involved in protecting their environment.<sup>38</sup> Another sustainable feature that the city is integrating in to its daily practice is a push toward a “zero waste” community. By 2040, the city plans to reduce its landfill contributions by 90%.<sup>39</sup>

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<sup>38</sup> United States. City of Austin. City Council. *Resource, Generation and Climate Protection Plan to 2020*. Austin Energy, 22 Apr. 2010. Web. 24 Mar. 2011.

<sup>39</sup> “City of Austin Solid Waste Services.” City of Austin. Web. 24 March 2011. <<http://www.ci.austin.tx.us/sws/zerowaste.htm>>.

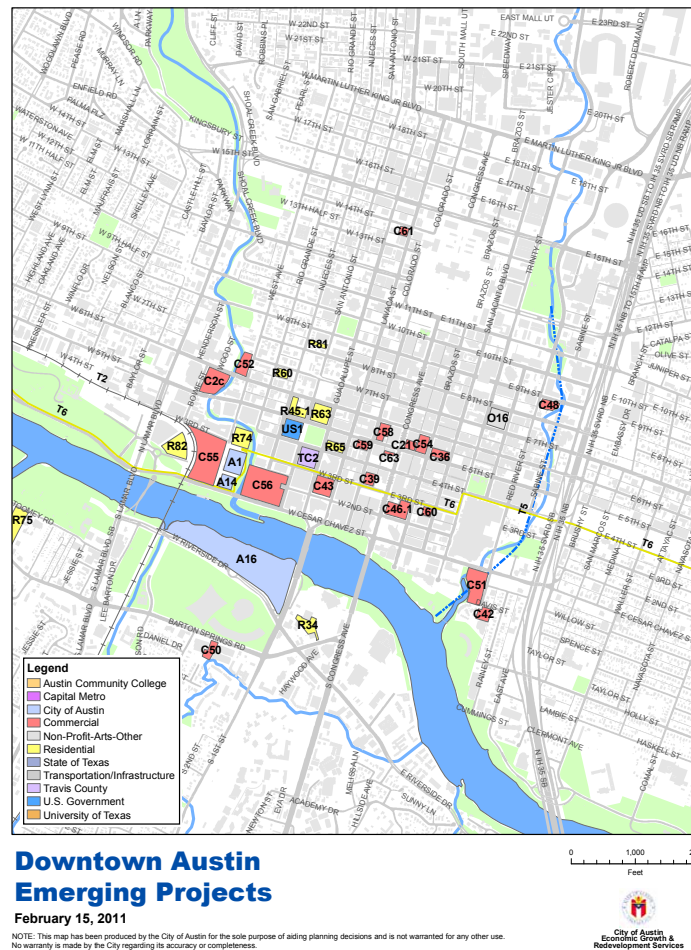


**Figure 27: Austin Transportation Plan. Graphic by City of Austin.**

#### 7.10: 2025 Proposed Development

The City of Austin recently rolled out a plan to revitalize, pedestrianize and make more sustainable their entire downtown district, as well as linking the outer lying regions more closely with the city. With its integration with downtown, Seaholm Power Plant is at the crux of many of these initiatives.

The cohesive downtown transportation plan has led to the development of all unused parcels of land in downtown so that they are performing to their maximum potential. The Seaholm site is central to this development corridor and new pedestrian and bicycle transportation areas.



**Figure 28: Downtown Austin Emerging Projects. Graphic by City of Austin.**

The main planning project that will change the face of downtown Austin will be the addition of a new rail line. This rail line will begin at the existing train station adjacent to the Seaholm site. Access to the rail line will be easily available by bicycle

and dedicated pedestrian streets. A dedicated pedestrian street will run between the city convention center and the Seaholm District master plan area.

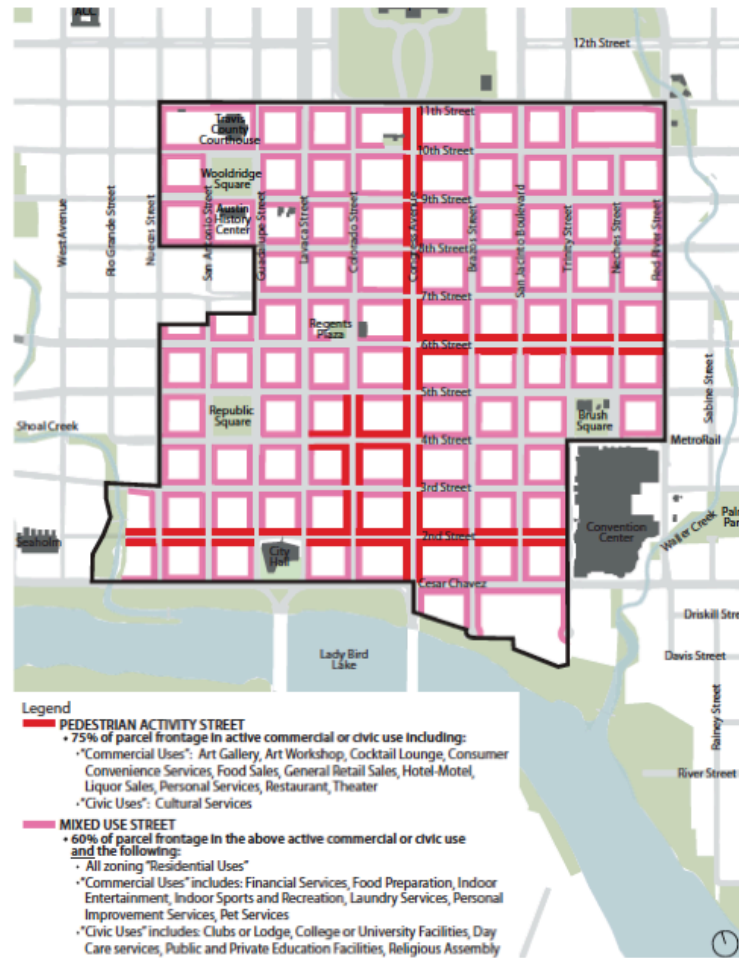


Figure 29: Austin Pedestrian Street Plan. Graphic by City of Austin.

## CHAPTER 8: SEAHOLM POWER PLANT

### 8.1: History

Light. Power.



**Figure 30: Seaholm Power Plant Southern Doors. Photo by Author.**

Austin, TX has no shortage of history. Today, at the corner of 5<sup>th</sup> and Baylor St. one can sit beneath the Treaty Oak, the lone survivor of the Council Oaks. Legend has it that in 1830, Stephen F. Austin, the leader of the Austin Colony, met with Native Americans beneath the Council Oaks to negotiate the first boundary of the state of Texas. Decades later, legend continues that Sam Houston rested beneath the Treaty Oak after his expulsion from the Governor's



**Figure 31: Historic Austin, TX. Photo by City of Austin.**



office for his involvement in the Civil War.<sup>40</sup> At the time, Austin was barely more than farmland, but this piece of geography played an integral part in the history of Austin, and the history of the state.



**Figure 32: MoPac Railroad. Photo by Austin History Center.**

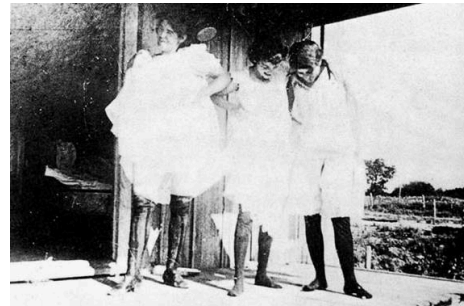
Blocks away, on the banks of the rushing Colorado River, industry sprang up less than a mile from the heart of the newly formed Republic of Texas. The same year that Texas joined the United States, a site at the juncture of the Colorado River and Shoal Creek was developed as a flourmill,

drawing water from the river to power the machinery. With the construction of the MoPac rail line through the east edge of the site in 1890, the flourmill was converted to a lumber mill to capitalize on the excellent piece of real estate and its proximity to the train depot. This site now became visitors' first glimpse of Austin after they exited the train. The mill's proximity to the train depot was ideal for shipping, but also allowed for an integral mingling with the heart of the developing city. As a small town that relied heavily on its shipping industry, vagrant travelers that hopped off the MoPac rail line at the depot on the corner of the Colorado River and Shoal Creek were a large economic driver in Austin. At a place where the Republic (and later, state) government, the newly founded University of Texas and the rail line travelers, a specific node of industry was formed.

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<sup>40</sup> "Treaty Oak." Wikipedia. Web. 6 July 2011.  
<[http://en.wikipedia.org/wiki/Treaty\\_Oak\\_\(Austin,\\_Texas\)](http://en.wikipedia.org/wiki/Treaty_Oak_(Austin,_Texas))>

A large portion of what is today known as downtown Austin was, in the mid 1800s, known as ‘Guy’s Town.’ In the throes of Guy’s Town sat the lumber mill, a private industry corrupt in the midst of it all. The men of industry, politicians and the MoPac



**Figure 33: Guy's Town. Photo by City of Austin.**

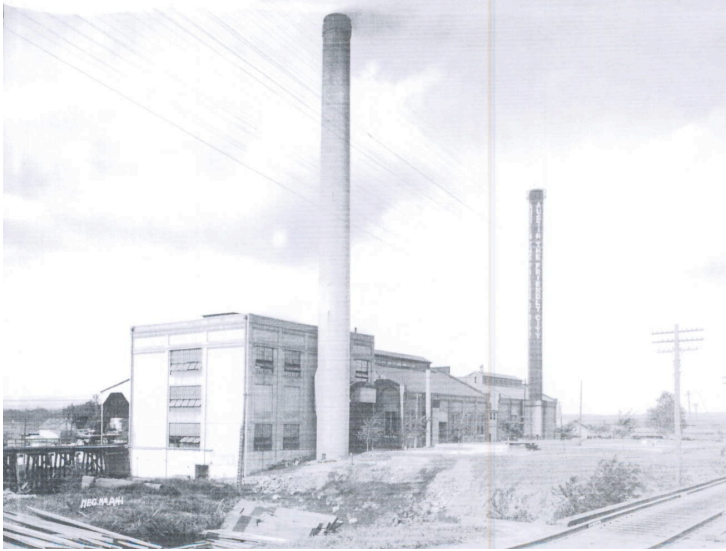
railroad attracted the natural growth of numerous brothels, casinos and saloons. What today is shiny new condominiums, manicured live-work space, restaurants with patios spilling on to the sidewalk, music venues and bars was once a village of dimly lit ramshackle “warehouses” that stored nothing but seedy entertainment. The old warehouse district was a meeting place for the masses – everyone from the lowest peons of the rail yard to the state legislators frequented the centrally located Guy’s Town. It was a site of wild times, but also a site of backroom deals and early state negotiations.<sup>41</sup>

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<sup>41</sup> Davis, Matthew E. (2006). *Memory of the Future: Adaptive Reuse of the Seaholm Power Plant, Austin, TX*. (Master's thesis, University of Maryland), Available from Digital Repository University of Maryland. (DRUM).



In 1893, the city of Austin commissioned its first electric power generation plant. For a city this size, they were on the forefront in obtaining electric power. The weight of



**Figure 34: City of Austin Power Plant #1. Photo by Austin History Center.**

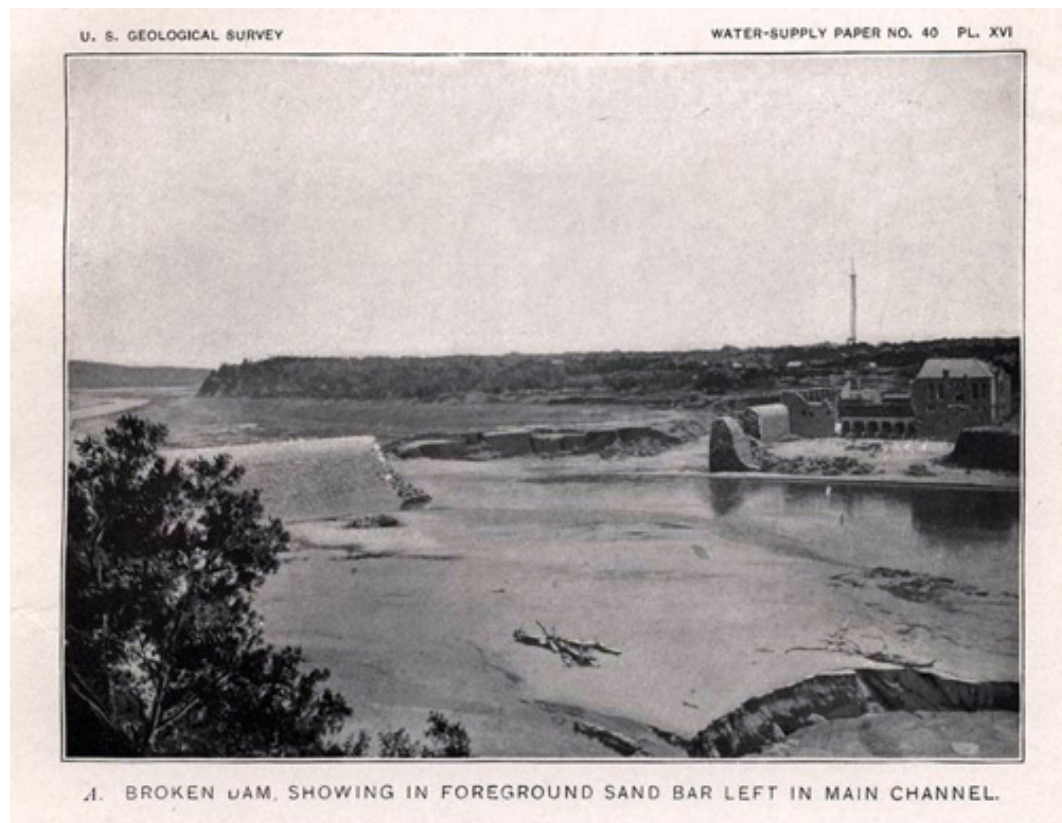
the Capital building surely helped expedite the process. This new plant was just east of the lumber mill and housed four generators that produced 24 MW of power. Two years later, the city lit up. Paid for by the same bond

package that enabled the damming of the Colorado River and construction of the power plant, 31 street lamps were installed.<sup>42</sup> The wave of street lamps were installed throughout downtown Austin, bathing Guy's Town in light. The voyeurism could no longer be anonymous under the cloak of darkness. This marked a transition phase for the character of downtown Austin. The cleaning up of the city took another horrific step forward in 1900. After two days of heavy rain, the Colorado River dam abruptly cracked and gave way on April 7. April 11's *Austin American Statesman* detailed the destruction by the wall of water twenty feet high and 1000 feet thick. It is reported that 47 people died that day as the 8-foot thick granite wall broke through. And so, in a biblical manner, Austin was cleansed. Countless buildings were destroyed and the city began a reconstruction. Painted on the smokestack of the power plant were the

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<sup>42</sup> "Seaholm District History." City of Austin. Web. 7 July 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

vertical words: “Austin: The Friendly City.” And such is the reputation that the town was trying to cultivate.



**Figure 35: City of Austin Dam. Photo by City of Austin.**

Austin continued to expand and progress. After his studies were disrupted by World War I, native Texan Walter E. Seaholm finally graduated from the University of Texas with a degree in electrical engineering in 1920. By 1922 he was Superintendent of the Electric Department for the City of Austin. Seaholm’s greatest legacy presented itself five years later when a private electric utility, Texas Power and Light Co., put in a bid to purchase the municipally-owned electric company and privatize it. Seaholm crunched the numbers and was able to prove that the City could operate the electric utility more cheaply and thus Texas Power and Light’s bid was rejected. Seaholm was a local hero.



**Figure 36: Walter Seaholm. Photo by Austin History Center**

Seaholm's reputation only got better. During the Great Depression, unemployment in Austin reached dire percentages and the Water and Light Departments (both now led by Seaholm) provided work on a rotating basis for

any able-bodied Austin citizen. For \$3/day, these men did manual labor at the power plant or the adjacent water treatment plant. The 1930s and 40s ticked on and Austin grew. Power Plant #1 had been commissioned by the city at a time when the population was barely over 20,000 residents. The 1940 census calculated 87,930 residents but by the time everyone returned from the war in 1948, Austin was a city of 132,000 people. Along with the tremendous population spike, American culture was entering a new era of rampant industrialization, consumerism and a baby boom and Austin was no different. The war veterans returned from Europe in droves and energized the cities. Single-family dwellings in suburbia became the rage and Austin began to expand geographically. Americans and Austinites now had televisions and were buying in to electrical appliances that were advertised on television, such as air conditioners (a hot commodity in the South), dishwashers and washing machines.

Obviously, Power Plant #1 was no longer meeting the demands of the city. The City Council contracted with Burns & McDonnell Engineering to design a new power plant. The Kansas City-based company had made a name for themselves in municipal power plant design. And like Austin Power Plant #2, many of their creations were of an art deco style. Burns & McDonnell produced the plans, and a local builder, J. M. Odom was awarded the construction contract for a bid of \$489,830.<sup>43</sup>

By now, the lumber mill was rubble. Its vagabond workers had moved on as downtown Austin was cleaned up. Its prime piece of real estate adjacent to Power Plant #1 was up for grabs. This prominent piece of waterfront property was cleared and excavated, ready for its next phase of life as Power Plant #2.

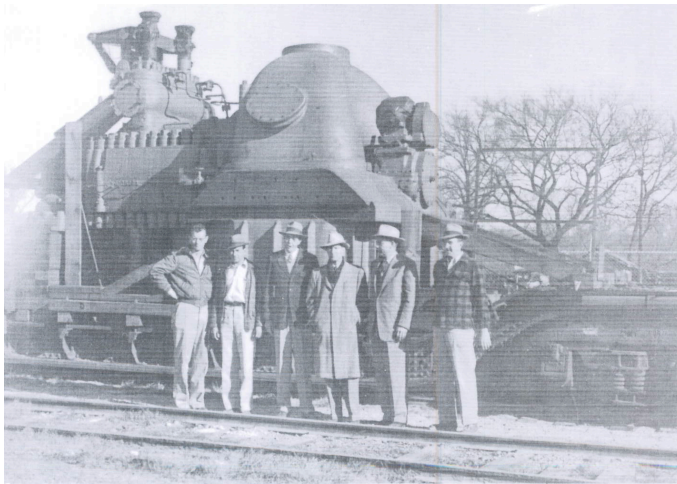


**Figure 37: Construction of Phase 2. Photo by Austin History Center.**

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<sup>43</sup> “Seaholm District History.” City of Austin. Web. 7 July 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

The plant was built in two nearly identical phases. In 1950, the eastern half of this mirror image building was constructed. Figure 37 above shows the 1955 construction



**Figure 38: Construction of Power Plant. Photo by Austin History Center.**

of the western half of the building with the completed eastern half adjacent and already producing power. This picture is looking south, toward the river. To this day,

the seam on the building where these Siamese twins

were sewn together is still obvious. The new 110,000 square foot oil-fired plant included a generator building with two Hydrogen-cooled turbine generators (but designed to house five), out door boilers, an oil heating plant, a demineralization building and a water intake structure (situated on the banks of Town Lake). The buildings are constructed in an “Art Moderne” or art deco style and made of “site-cast structural concrete, scored concrete panel cladding, metal divided-light windows and glass blocks.”<sup>44</sup>

Since the end of the Second World War, the City of Austin Power Plant’s conception, construction and existence has been a solid, stoic reminder of societal evolution in the twentieth century. The building is a metaphor -- a metaphor for power and light:

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<sup>44</sup> “Seaholm Power Plant.” Texas Historical Commission Atlas. Web. 24 March 2011. <<http://atlas.thc.state.tx.us/shell-site.htm>>.

emergence from hard times, the tremendous growth of the city despite trials and tribulations and above all, hope for the mysteries that lay in the future. This building was an iconic investment by the city – a concrete (literally) symbol for how far the city had come in 100 years, and what a figure on the state and national stage and would become. Power Plant #1 proclaimed to passersby on the MoPac rail line that Austin was the “Friendly City.” Vagrants and politicians were begged to get off and take root. Just 50 years later, Austin had come in to its own and this time proclaimed to the world of its’ light and power.

Aside from the metaphor of the building’s role in Austin’s cultural and technological progress, the building is a mere metaphor for power generation itself. While it looks powerful, strong and capable to passersby, the exterior is nothing but a hollow shell that plays no role in the crucial operations carried out within. The entirety of the beautiful 65 feet of the building that emerge above grade is empty: nothing but dead air, and a few offices. It is what is hidden below ground in the bowels of this cavernous 110,000 square foot behemoth that works magic. The physical form of the building added to the grand metaphor of this tremendous new building on the Austin skyline.

Walter Seaholm retired in 1955 with numerous commendations from the City for his 30+ years of service. Under his watchful eye in positions such as City Manager, Director of Utilities and Superintendent of Water and Light, he saw Austin grow from a mere town of 35,000 to a real city of 180,000. The Mayor W.S. Drake, Jr. also



credited him with saving the City of Austin Power Plant (#1) from privatization – a move that had since proved to be quite profitable to the city, as the public electric utility had become their greatest source of revenue.<sup>45</sup> Shortly after receiving these high honors from the City government, Seaholm passed away. In October of 1960, a ceremony was held to posthumously rename Power Plant #2 in dedication to Walter E. Seaholm.



**Figure 39: Complete Power Plant. Photo by City of Austin.**

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<sup>45</sup> “Seaholm District History.” City of Austin. Web. 8 July 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

Since it became the Seaholm Power Plant in 1960, the manner in which Austinites interact with their power source has changed. In its early days, citizens were allowed to visit their public electric utility to pay their bill on site in offices upstairs that overlooked the cavernous turbine hall. At that point in time, the plant was new and shiny, and a true sign of technological and psychological progress. As housewives and WWII veterans walked up the steps to the city's monumental new electric utility headquarters, they were in awe of both the monumentality of the building, and the symbolic nature of the words above the door. Along the south face on the east entrance of the building the door says "POWER" in bold letters, and on the west, "LIGHT."



**Figure 40: Northwest corner of Seaholm Power Plant. Photo by Austin History Center.**

The electric lights along the west side of the building were a proud greeting to those on the MoPac rail line, welcoming them to the proud city of Austin.



As time passed, the Seaholm Power Plant took on new meaning. It became less and less accessible to the public as fewer people paid their bill in person and eventually that option was all but obsolete. Cesar Chavez St. became a busier road and fences were installed. While the plant was no longer the symbol of progress that it had once been, it was a stoic reminder of the solidity and stature that Austin held in Texas and the nation. The plant became more of a beautiful mystery. Its turbine hall had always been untouchable to visitors, but now the entire building was becoming more closed off as the ground leached up oil sludge. Throughout the mid 1900s, the plant chugged on, generating 120,000 kilowatts of power per day, a paltry amount compared to the 1970s era Decker Power Station that produced 325,000 kilowatts.<sup>46</sup> In 1989, electric production groaned to a halt and the front doors of Seaholm were chained. The building sat in disrepair, growing more and more eerie and mysterious in the ever-changing skyline. And all along the red lights glowed in the night.



**Figure 41: Seaholm Power Plant. Photo by flickr.com**

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<sup>46</sup> “Seaholm District History.” City of Austin. Web. 24 March 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

No one is certain what the future holds for Seaholm, but they do know that it is a critical part of the Austin skyline. In 1991 the city committed to the preservation of the building due to its extraordinary historical and architecture character. It was not until 1997 that the City Council formed the Seaholm Reuse Planning Committee to protect the structure and plan for its eventual reuse. The group was charged with gathering public opinion on how to best reuse the cavernous structure.<sup>47</sup> The Committee's initiatives did not gather much speed and in 1998, leading local architect Sinclair Black founded the "Friends of Seaholm" group hoping that the project would gather speed. Concurrently, the Texas Historical Commission was investigating the Power Plant and its contributing water intake structure to determine its historic value. In 1999, it was determined that the two were eligible for listing on the National Register of Historic Places.<sup>48</sup>

Little definitive progress was made until 2005 when the site was finally deemed safe for occupation. Austin Energy commissioned a thorough cleanup of the site, which encompassed ground decontamination, roof replacement and equipment dismantling and removal. The URS Corporation, managing the cleanup, was responsible for an insurmountable amount of PCB toxins, asbestos, lead paint, mercury deposits and oil sludge. The site had been highly toxic, sick and downright dangerous, adding to its aura of mystique behind its bolted chain-link fence. But renewal and purification took place on this plot of land at the Colorado River and Shoal Creek once again and

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<sup>47</sup> "Seaholm Power Plant Reuse." City of Austin. Web. 18 August 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

<sup>48</sup> "Seaholm District History." City of Austin. Web. 24 March 2011.  
<<http://www.ci.austin.tx.us/seaholm/history.htm>>.

the site was renewed. The EPA issued a “Ready to Reuse” certificate for the facility, an unprecedented coup for a building that was a PCB remediation site. The total cost to Austin Energy (and the city taxpayers) totaled \$15 million.<sup>49</sup>

The fresh new Seaholm Power Plant officially became a Recorded Texas Historical Landmark in 2007, officially solidifying its standing as a prominent Austin structure. In the state of Texas, Recorded Historic Landmarks are subject for THC review if modifications are proposed for the building exterior.<sup>50</sup> It was also around this time that sincere efforts were once again placed in to finding an appropriate adaptive reuse for Seaholm. A number of prominent local and national firms filed entries and a winner was selected in Ayers St. Gross’s design, led by Architect Scott Vieth. Vieth and his team were in the early stages of schematic design, still searching for an appropriate building program when the economy abruptly sank and the Seaholm adaptive reuse project was tabled, once again.

If you ask Austinites of today what this building means to them and their city, everyone speaks of those gothic red letters, ever present in the night sky. The building has become a local cult and cultural phenomenon, and not one to fade away in to the night. For centuries, this site at the juncture of Shoal Creek and Town Lake has been at the forefront of progress and on the cusp of all that was important to Austin. This site has been a symbol of light, power and the commitment to move

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<sup>49</sup> “The Seaholm Complex.” Friends of Seaholm. Web. 24 March 2011. <<http://friendsofseaholm.com/Pages/building.html>>.

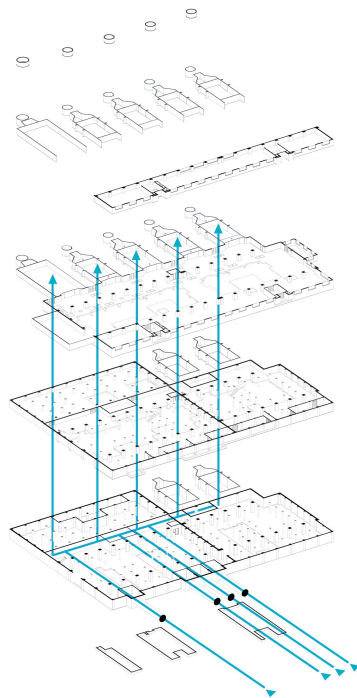
<sup>50</sup> Interview with Caroline Wright, THC. March 1, 2011.

forward, learn and create a better future for the city. The future use of the Seaholm Power Plant should be no different.

Light. Power. Knowledge.

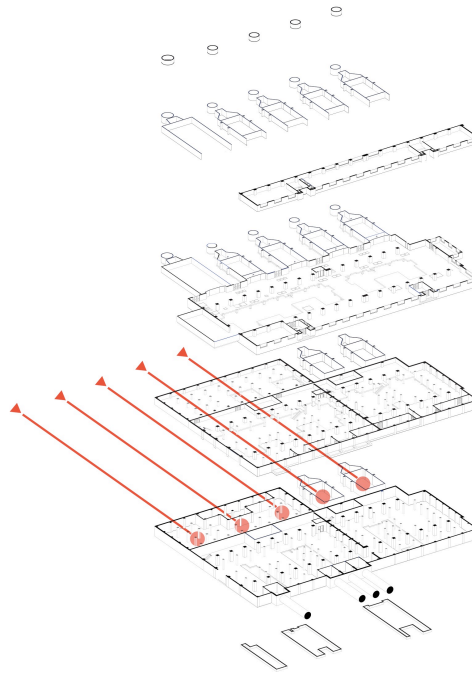
## 8.2: Original Processes

Understanding how the original oil-fired electricity generation worked within the power plant was an important initial step in determining how the plant should function in the future.



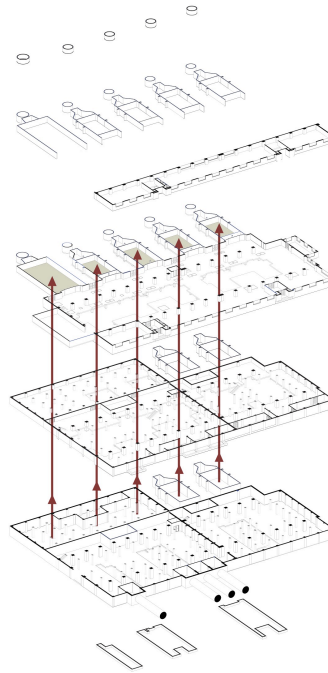
**Figure 42: Step 1, Oil Firing Process. Graphic by Author.**

The first step in the oil to electricity process was the importing of water from neighboring Town Lake. The water was sucked through the pumping station and pumped north through a series of underground pipes. It was then moved up the building in to the boilers on the ground level where it circulated through a spider web of small pipes.



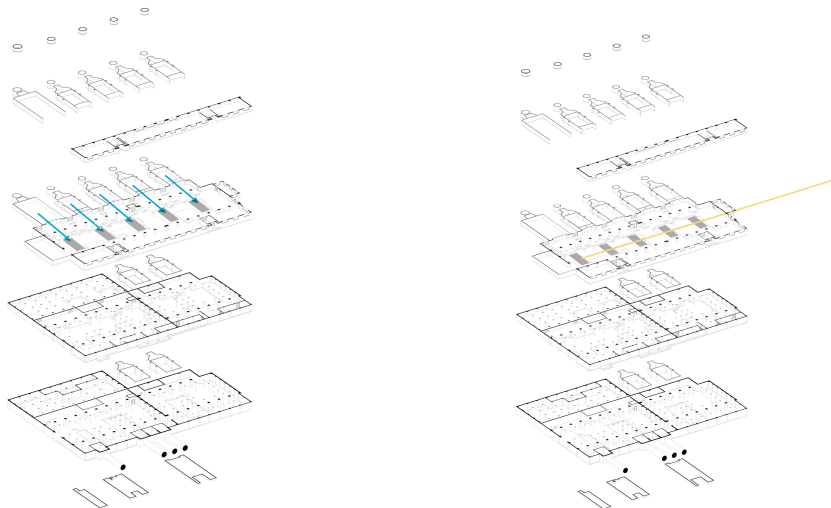
**Figure 43: Step 2, Oil Firing Process. Graphic by Author.**

Concurrently, oil is piped from the oil house and storage drums to the lower basement portion of the boilers. There it is fired. As is shown in figure 44 below, the oil fired in the boilers produced heat, which rose to the ground level boilers, where it met with the water circling in the pipes.

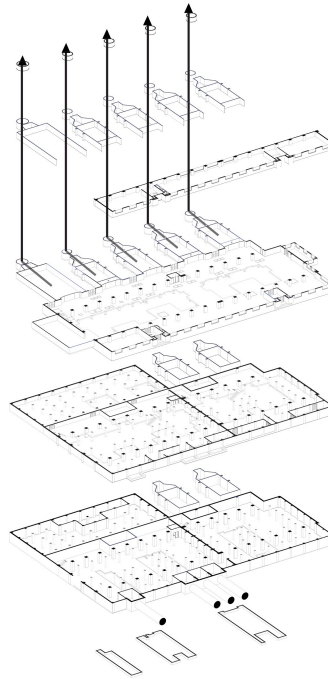


**Figure 44: Step 3, Oil Firing Process. Graphic by Author.**

When the heat from the boilers mixed with the cool water piping, steam was created. This steam was sent to the turbines suspended in the hall. The steam powered the turbines and power was generated, which was sent directly east to the adjacent electrical substation.

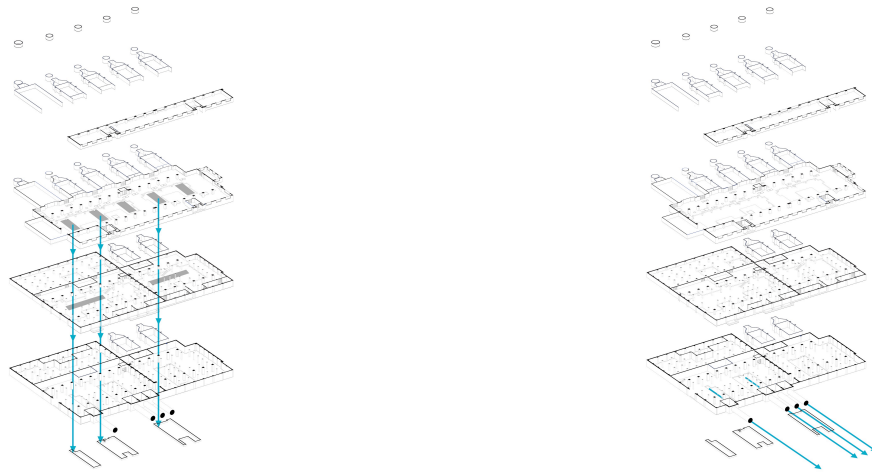


**Figure 45: Steps 4 and 5, Oil Firing Process. Graphic by Author.**



**Figure 46: Step 6, Oil Firing Process. Graphic by Author.**

Naturally the oil firing process resulted in toxic byproducts. The burning of the oil produced acrid smoke that was ventilated out of the stacks. Oil sludge had to be removed by transportation and stored at a toxic waste facility. Some oil sludge seeped in to the ground causing damage to the natural environment. And finally, the water that was returned to Town Lake was of a lesser quality than the water that was initially pumped in. After the steam was utilized by the turbines, excess condensation moved down through the condensing units in the upper basement. The condensing unit discharged in to the lower basement and then the water was sent back to the river.

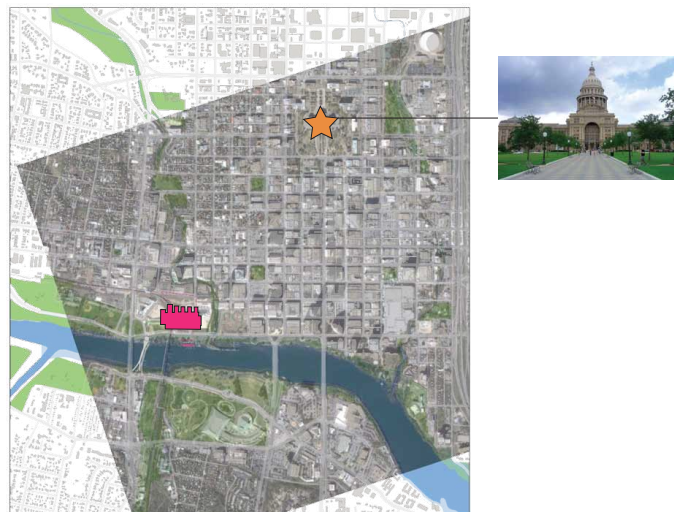


**Figure 47: Steps 7 and 8 of Oil Firing Process. Graphic by Author.**

### 8.3: Site Analysis

The Seaholm Power Plant is advantageously placed in the southwest corner of downtown Austin. As aforementioned it has excellent connections to current and future public

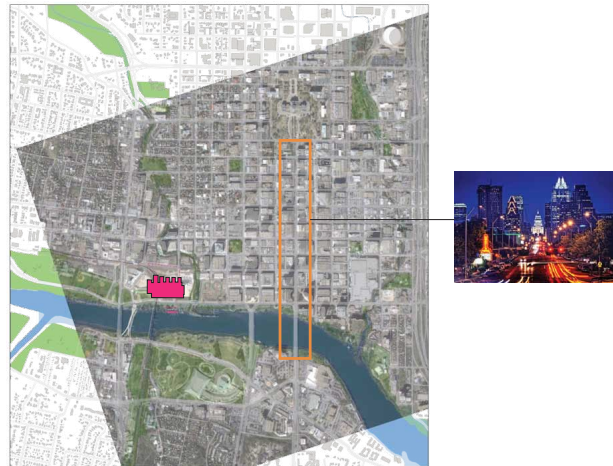
transportation, the Town Lake Hike Bike Trail and the many critical city buildings. The new city hall is two blocks away, the convention center is about a mile to



**Figure 48: City Connections, Capitol. Graphic by Author.**



the east and the Capitol building is 1 mile to the northeast. The Congress Street National Register Historic District is .2 miles away and runs from Town Lake to the Capitol building.



**Figure 49: City Connections, Congress Street. Graphic by Author.**

The new popular city venue, the Long Center for the Performing Arts, circa 2004, is just across the water from the Seaholm Power Plant. By car it is just shy of 1 mile but may also be reached by foot by crossing the Pfluger pedestrian bridge.



**Figure 50: City Connections, Long Center. Graphic by Author.**

## 8.4 Cultural Significance

The Seaholm site, long before the building's existence, has been at the heart of the city. With its connection to both the water and the railroad, the site has given energy, both literally and figuratively, to the city since the inception of the town. Throughout the phases the site has taken on, it has always been buzzing with activity. In its transition from Mo-Pac railroad lumber yard, Power Plant Number 1 and Power Plant Number 2/Seaholm, the site has been buzzing with city vitality and, at times, was literally energizing the city and its citizens.

Today, it has retained that role. Since the completion of the site cleanup in 2005, Seaholm has stood dark – a cavernous empty shell standing alone in a field of tall prairie grass. And yet it has never stopped attracting attention and causing an electric stir among Austinites. Perhaps it is the iconic gothic red letters that light up at night, or perhaps it is the beautiful art deco concrete, but whatever it is, a grassroots surge of interest has cropped up in the community. As of March 2011, the Seaholm Power Plant site does not currently have electricity, running water or restrooms. And yet, according to Austin Business Journal, the city receives nearly 1 solicitation each day from parties interested in renting out the raw space for the relatively low price tag of \$500/day.<sup>51</sup> In 2010 alone, the Seaholm Power Plant and grounds were used for wedding photography, black tie fund raisers, city-wide New Years and 4<sup>th</sup> of July celebrations, movie shoots (Seaholm may be seen in Paramount Pictures 2011 Best

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<sup>51</sup> "Seaholm Power Plant's Blank Canvas Spurs Imagination in Event Planners." Austin Business Journal. Web. 17 May 2011. <<http://www.bizjournals.com/austin/stories/2010/07/19/story8.html>>

Picture nominee *True Grit*), art-house movie screenings, concerts, MTV dance parties during the SXSW music festival and the highly popular annual Zombie Ball, an Austinite favorite.<sup>52</sup>

## 8.5 Proposed Master Plan Analysis

In 2008, the city drew to a close a competition for the design of the Seaholm District master plan, including a schematic design for the adaptive reuse for the Seaholm Power Plant itself. Southwest Strategies Group, a local development corporation won the bid. Their submission included architectural designs for nearby buildings, as well as the Seaholm building itself, by Baltimore architecture firm Ayers



**Figure 51: Seaholm District Master Plan. Graphic by City of Austin**

<sup>52</sup> “Seaholm In The News.” Seaholm Power LLC. Web. 27 March 2011. <<http://www.seaholm.info/html/news.html>>.

Saint Gross. The winning master plan for the Seaholm District includes a new library just east of the existing plant building (along Cesar Chavez Rd.), the construction of an enclosure to disguise the Austin Energy substation east of Seaholm and north of the library, and the addition of two new buildings directly north of Seaholm, sharing its 8 acre plot of land. While these two buildings are still in the schematic stages, Scott Vieth, the aforementioned Seaholm project manager with Ayers Saint Gross, postulated that they would end up becoming a hotel on the northeast corner (quite tall, as the CVC does not cross that portion of the site) and a low rise commercial and residential development on the northwest corner rising only to 2 floors off grade. The circular promenade in the middle functioned as an entrance to both the hotel and the power plant and a parking garage was placed on the west side of the hotel building, rising an imposing 5 stories above grade.

The master plan, now half constructed on the site, leaves me with two options. I could utilize Ayers Saint Gross's proposal for the north side of the site, shadowing in their hotel buildings as future development on the lot. Or, I could utilize the land in my own scheme, which would inevitably create a closer site linkage between Seaholm itself, and the remainder of the site's program.

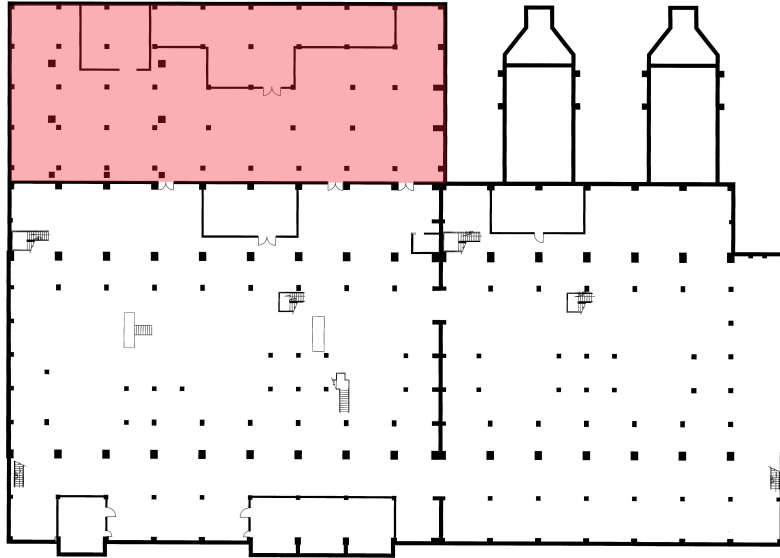
For the power plant building itself, Ayers Saint Gross, as of April 2011, does not even have a program for the raw concrete space. The majority of the Seaholm redevelopment is currently in the construction document phase or actively under construction. The Seaholm Power Plant and its companion buildings to the north

have not yet emerged from schematic design. When the economy crashed in 2008, the project was just kicking off. As the economy took a hit, the redevelopment of Seaholm was tabled and remains so today. In initial design iterations, Ayers Saint Gross fitted the power plant with a library program (hoping to convince the city that the library to the east would function just as well in the existing building). It proved too late for this idea as the library's construction documents were nearly complete. Another possible option was to relocate either the Austin Museum of Art or the Austin Children's Museum (both currently occupying spaces in downtown Austin office buildings) in the power plant. As neither party was interested in this move, those ideas fell by the wayside, as well. And so the Seaholm adaptive reuse project remains dormant. Ayers Saint Gross, Austin Energy and the city planners working on the Seaholm District redevelopment all want to retain Seaholm's cavernous spaces for at least semi-public use. What this use will be is to be determined.

## 8.6 Existing Building Analysis

The beautiful, raw cavernous spaces of Seaholm are complicated, and at times choppy, but large enough to easily accommodate the majority of desired programs. There are three main floors: two below-grade basements and one ground floor. A mezzanine runs along the southern edge of the building.

The lower basement is 22 feet below grade and 26 feet below the ground floor plane level of the building. The total square footage of the lower basement totals roughly 41,360 square feet. The space may be broken down in to areas of occupation.



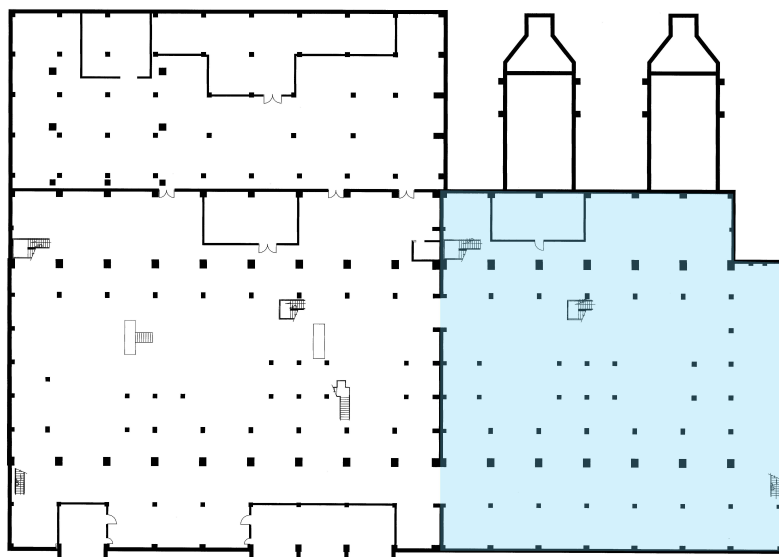
**Figure 52: Lower Basement. Graphic by Author.**

In the northwest corner of the ground floor is a large, dark columned room. It totals 9,601 square feet. The columns are on a grid about 12' apart. With a floor-to-floor height is 12' 8" and being so far underground, the space is cool, voluminous and quite dark. Almost no natural light is able to filter down to this area of the building, and it is also somewhat inaccessible. To reach this area of the building it is necessary to take multiple spindly metal staircases. As it stands, this area of the building is not handicap accessible.



**Figure 53: Lower Basement 2. Graphic by Author.**

The lower basement may be divided in to two halves. The thick concrete wall that bisects the lower halves of the building is quite porous but a mental barrier nonetheless. This area is 17,450 square feet and while totally habitable, it is textured by large grates in the floor covering machinery and collection areas below. The side aisles maintain the 12' 8" height similar to the adjacent area but the central portion

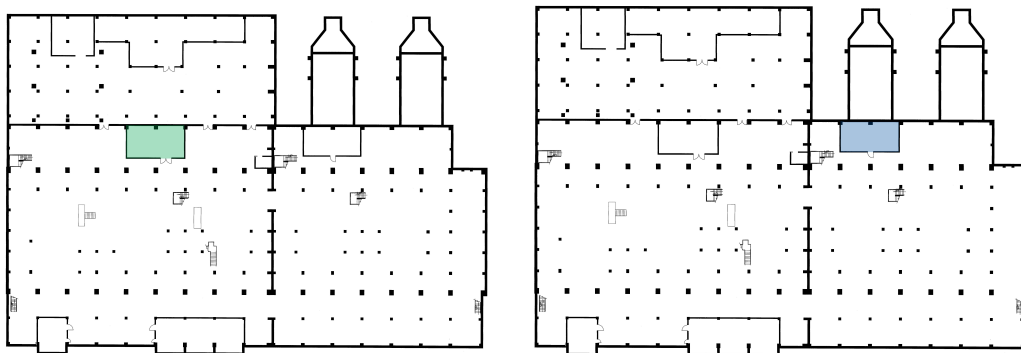


**Figure 54: Lower Basement 3. Graphic by Author.**

below the machinery cut outs soars to the ceiling height of 76 feet. Accessibility is also an issue in this area of the building, and will continue to be on all lower levels.

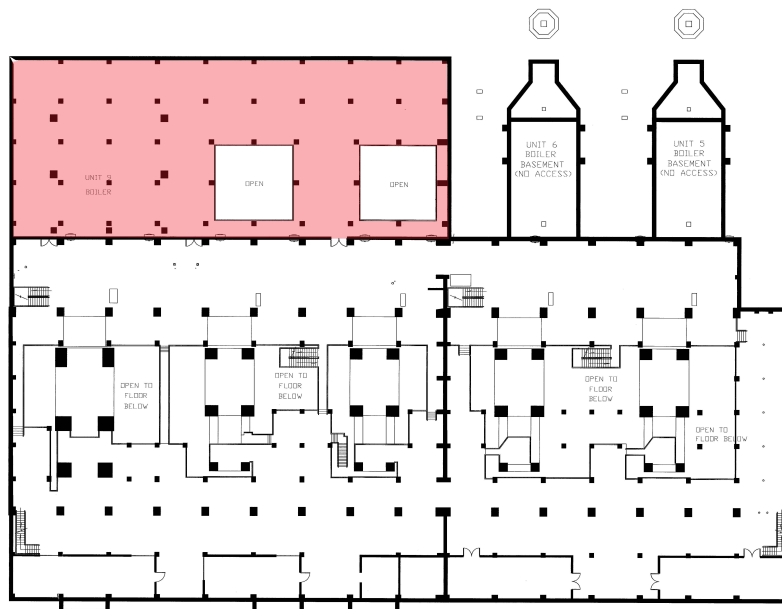
There is not currently an elevator in the building that provides access to the lower or upper basements and until this is rectified, these two areas will not be handicap accessible.

The southeastern corner of the building shares similar character to its southwestern component on the other side of the dividing wall. The square footage of this area is 14,145 square feet.



**Figure 55: Small rooms in Lower Basement. Graphic by Author.**

Two rooms occupy space within the lower basement, one in the southwestern quadrant and one in the southeastern. On the west side, the small room is 619 square feet and on the east it is 553 square feet.

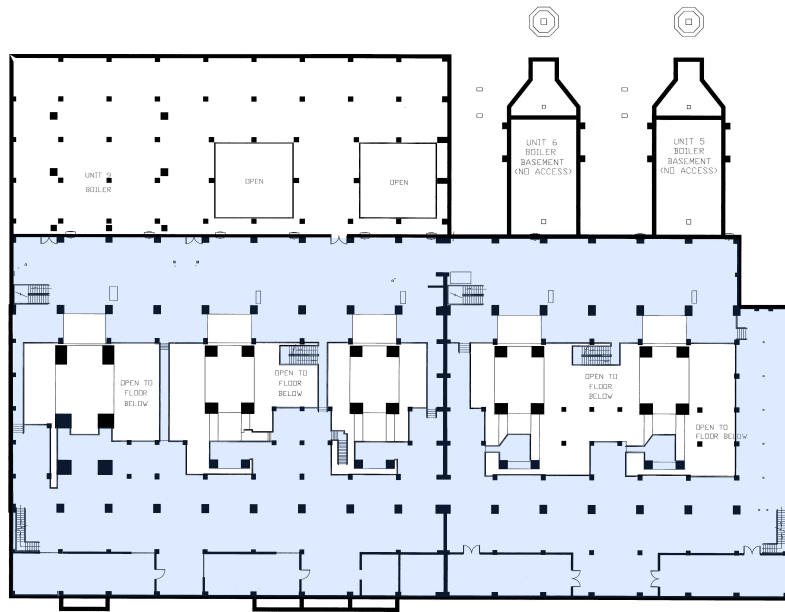


**Figure 56: Upper Basement. Graphic by Author.**



The upper basement is 9 feet below grade and 13 feet below the ground floor plane level of the building. The total square footage of the upper basement totals roughly 32,982 square feet.

The northwest portion of the upper basement totals 8,001 square feet. It has an identical footprint to the lower basement and obviously the same column grid of 12 feet. The two holes open to below total 1,600 square feet.

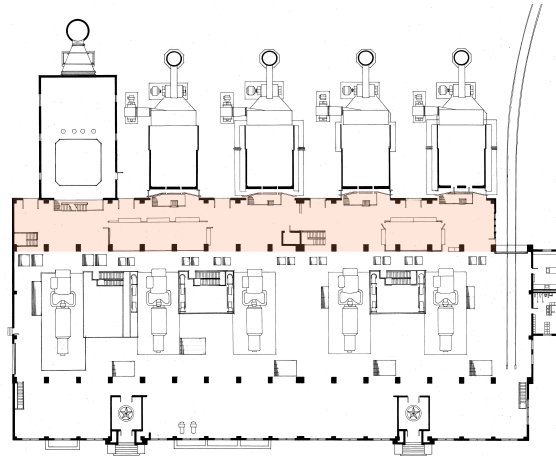


**Figure 57: Upper Basement 2. Graphic by Author.**

The southern portion of the upper basement has 23,495 usable square feet. The holes in the floor take up 10,068 square feet, resulting in a total area of 33,563 square feet.

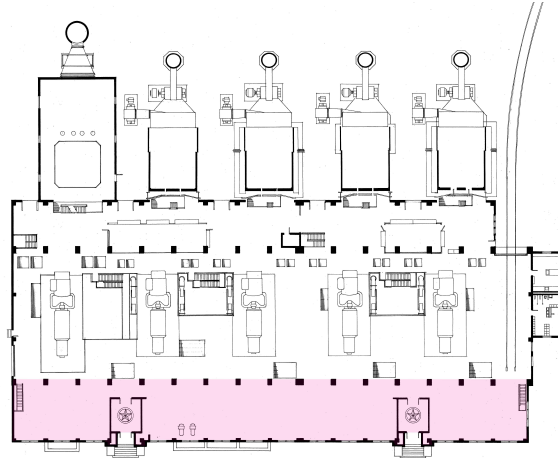
The middle portion is open to the ceiling 63' above. Between the last set of columns on the wall of both the north and south edges of this space the ceiling is only at 14 feet. Along the southern edge there are a series of enclosed spaces. These detract 4,358 square feet of open, habitable space. Between this southern poche space and the mechanical holes is a distance of 21 feet. On the north side the clear distance between the mechanical holes and the back wall is 26 feet. Light is good in the areas

that are open to the 63' ceiling above, but become quite dark and still when one strays too far in to the northern or southern depths of the building, away from the sunny Turbine Hall. As aforementioned, the lower basement currently has very poor accessibility.



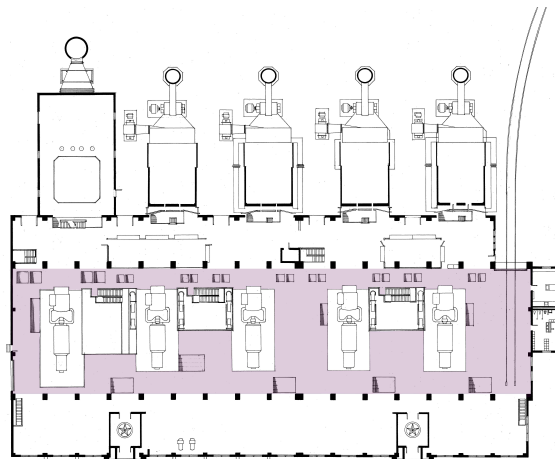
**Figure 58: Ground Level. Graphic by Author.**

The ground floor of the Seaholm Power Plant rests 7 stairs (roughly 4') above street level. It can be divided in to three distinct areas. The first is the northern length, a tall, narrow space that is punctuated by metal staircases for access to the boilers and stacks. This area is 7,057 square feet and has a floor-to-floor height of 27' 6". It has a width (from northern face of column to wall) of 23' 4". It has good natural light and is punctuated on its east end by glass block windows, providing diffuse light and privacy. The stair towers to the boilers give this end of the building a mysterious, spider-like texture. It is easily accessible (once one finds a way in to the building other than the stairs in front).



**Figure 59: Ground Level 2. Graphic by Author.**

Along the southern edge of the ground floor is an intimate area punctuated by the entrance vestibules. 14' 10" above the finished floor the concrete ceiling comes across. This area is supported by the colonnade along the edge, which is 28' 2" from the inside face of the southern wall. As this area of the building does have southern facing windows, it has good light, especially when compared to other areas of the building. It also has good accessibility. It does have awkward corners because of the entrance vestibules, but has the potential for being a well-lit, human-scale space contrasting the vastness of the Turbine Hall.



**Figure 60: Ground Level 3. Graphic by Author.**

The Turbine Hall claims the majority of the ground floor square footage, although quite a bit of the most valuable square footage is lost to the machinery holes. The space in total is roughly 220' long (east to west) and 63' wide (north to south). It soars to a height of 50' from the finished floor at its apex. Before the machinery holes are subtracted, the turbine hall has a total square footage of 36, 576 square feet. With both machinery holes subtracted from the total space, the usable space calculation comes to 29, 790 square feet. While this is a substantial amount of space available, given the configurations and limitations brought about by the strange cut-outs in the floor, some of this space will be rendered unusable, while others will just be a casualty of working around safety regulations (guard rails, keeping a sufficient distance from the edge of the mechanical holes, etc). Further, the area that bridges the two machinery holes is 28 feet wide, a fairly generous width. This entire bridge area, while useful, will most likely also not be programmable. These drawbacks being said, because of clerestory windows on both the north and south sides and a wall of windows on the east side, the Turbine Hall has good natural light which is filtered in to the space from above. Access is also good, although perhaps not straight-forward, as one will have to carefully navigate around the mechanical holes.

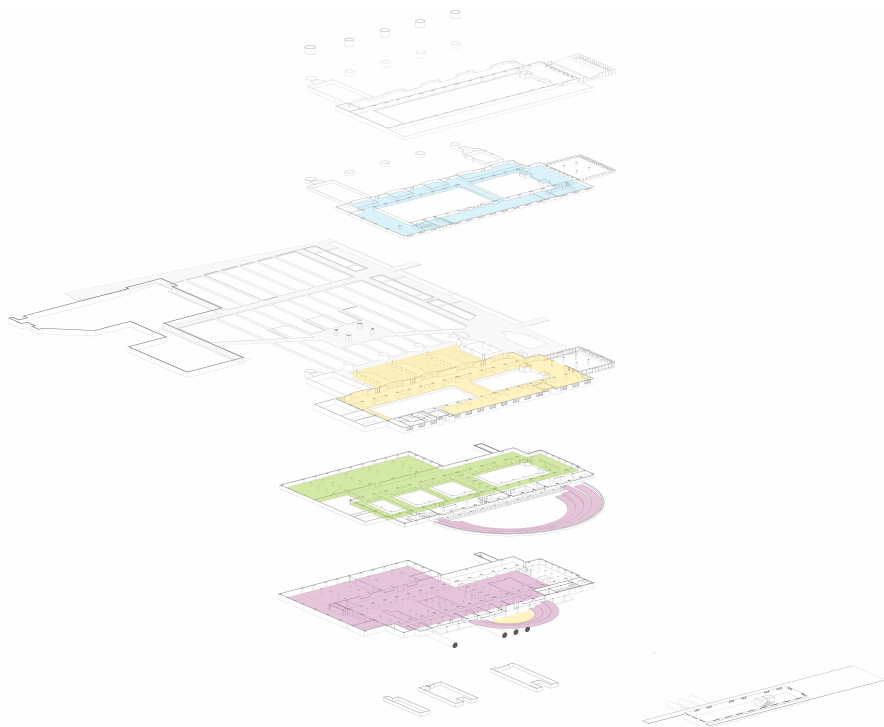
The Mezzanine runs along the entirety of the south side of the building. It boasts 8, 302 square feet, with an additional 400 square feet (totaling 8, 702 square feet) for egress (stairwells). While offices may have at one point carved up the interior of the mezzanine, it is now a series of 3 open plan rooms, punctuated near the stairwells by rest rooms. The mezzanine spans from the south edge of the building to 30 feet in to

the Turbine Hall. The light is quite good as a south-facing window is placed every 16' 6" on center. The mezzanine is also rather Tate Modern-esque in that it overlooks the Turbine Hall with a series of windows that begin 85 feet from the east side of the building and run for 80 feet (roughly 5 bays). This allows light to be shared between the clerestory windows in the Turbine hall and the mezzanine. Unfortunately, accessibility in this area is very poor. The stairwells most likely do not meet current fire code (they are completely open). No elevator services this area.

## CHAPTER 9: SEAHOLM POWER PLANT ADAPTIVE REUSE

### 9.1 Proposed Use

The challenges in designating a program for an 110,000 square foot building are many, and they have continued to befuddle the City of Austin, Austin Energy and the Seaholm reuse project team. After considerable historical and community research I have developed a 4-part program divided essentially by building level which will provide for resources, economic generators and public interaction spaces.



**Figure 61: Program Diagram - Blue as Office, Yellow as Event, Green as Green Building Resource Center, Purple as Innovative Tech Space. Graphic by Author.**

On the ground level I am dedicating the space to what the residents of Austin have decided for themselves: this is an ideal rentable event venue. Austinies have

discovered innovative and fascinating ways to utilize the space. I therefore propose that the great Turbine Hall remain much as it always has been – a great, open space; an ideal venue for a wide variety of functions. This room should have the capacity to function as however community members deem it appropriate. Poche elements of the program that are essential to its functionality (restrooms, janitor's closet, storage, showers, facilities office, catering kitchen) will hug the southern edge of the building under the existing mezzanine and the west end where the 1970s addition borders the train tracks.

As Austin Energy owns the Seaholm Power Plant, the public electric utility, it is essential that Austin Energy somehow benefit from its reuse. Austin Energy Green Building, a sect of the company that pioneers all of Austin's sustainability initiatives since the 1980s may be able to utilize the mezzanine space in the Seaholm Power Plant in a valuable way. As Austin Energy Green Building in its infancy led directly to the demise of the plant's electric production, I propose to create a mezzanine level hub as office space for Austin Energy Green Building and the newly created City of Austin Sustainability office. Right now these two like organizations are housed in two separate office buildings and do not enjoy the benefits of collaboration. This new hub for sustainability initiatives would allow for collaboration leading to greater innovation and exposure to the public. One office would occupy the existing mezzanine while one would occupy a newly created mezzanine on the north side of the Turbine Hall. Austin Energy may also be able to utilize the spaces under the mezzanine in the Turbine Hall as marketing/PR space. While the side axes of the

Turbine Hall will be devoted to flexible bar/serving space for events, glass panels that will present Austin Energy marketing materials and building history will line them so that event space visitors are exposed to both types of informational panels.



**Figure 62: Under Mezzanine Marketing Space. Graphic by Author.**

On the upper basement level, I am proposing the use of flexible space for a Green Building Resource Center. The City of Austin does not have a green building resource center. While many citizens are aware of the role they can play in their community and the greater environment, not all are. Or some residents know a bit about being more environmentally friendly and strive to be in their homes and everyday lives, but do not know where to begin. Two hours southwest on I-290, the City of Houston opened the Green Building Resource Center in 2009. Run by the city government, the Green Building Resource Center is a resource for how to save



money on energy costs or be more green in your daily life – both at home and in the office. And likewise, how to make your home or office more “green” without major renovations. This allows a layperson that does not have the money or time to consult an expert or undergo a major renovation to learn quick tips, straight from an expert, on how they might contribute to their community and the greater world at large.<sup>53</sup> This facility would also serve as a materials library, where local businesses that sell certified green products could display their wares, allowing green building vendors and consumers to meet in one convenient location and discuss which products would work best for their specific projects. This center would be a resource for all sectors of the community: industry people, Austin residents, school children, etc. Ideally, Austin Energy and the city government would appoint a sustainability expert to both design exhibits for education galleries at the Seaholm Power Plant exhibit space, and work out of the space so that they may be available to community members as a resource.

As aforementioned, the city of Austin plans to reduce their landfill contributions 90% by 2040. Pioneering in sustainable, environmentally friendly initiatives since the mid to late twentieth century, awareness in energy production and consumption has been at the forefront of the minds of Austinites. Sustainable initiatives are ingrained in community culture. In an effort to Keep Austin Weird and forward thinking, I propose that an energy production/leasable technology research component be added back in to the Seaholm Power Plant. The lower basement is an

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<sup>53</sup> Interview with Steve Stelzer, Houston Green Building Resource Center. August 25, 2011.

ideal place for this type of work. With its rough industrial layout it may be utilized for research space in its relatively unchanged form. And given the historic nature of the plant's processes, the lower basement is an appropriate location for research and power generation activities.

Appropriate clients for this space include small, innovative new companies including that do small-scale, clean waste-to-energy work. Two such companies currently exist and entirely appropriate for this application. This new E-Generation technology, Visiam, cleanly turns organic waste and turns it in to marketable byproduct. This would combine both Seaholm's historical industrial use of fuel production and a key cultural component of the city and its progressive nature. This space would be marketed to companies like Visiam with the promise of greater exposure and connections for greater collaboration. With the voluminous siting in the Seaholm Plant, views would be afforded of the research area from all other floors, allowing for potential investors or interested parties to look upon the processes. The proximity to the sustainability offices on the mezzanine and the green building resource center on the upper basement could also attract new investors and incite greater press. The University of Texas is also about 2 miles away and collaborations with their science program may be beneficial.

The Visiam waste to energy technology is on a much smaller scale than today's typical waste-to-energy plants. The Visiam system operates with pods, like the one pictured in Figure 63 below. These pods range from 6' x 6' to 8' x 32',

depending on client's size requirement. They may be used standing alone, or ganged together.



Figure 63: Visiam Pods. Photo by Visiam.

The system operates quite cleanly, with no dangerous or flammable off-gassing as in other waste to energy systems. The process involves shoveling waste of all types (no need to separate waste from recyclables) in to the pod and adding greywater. The

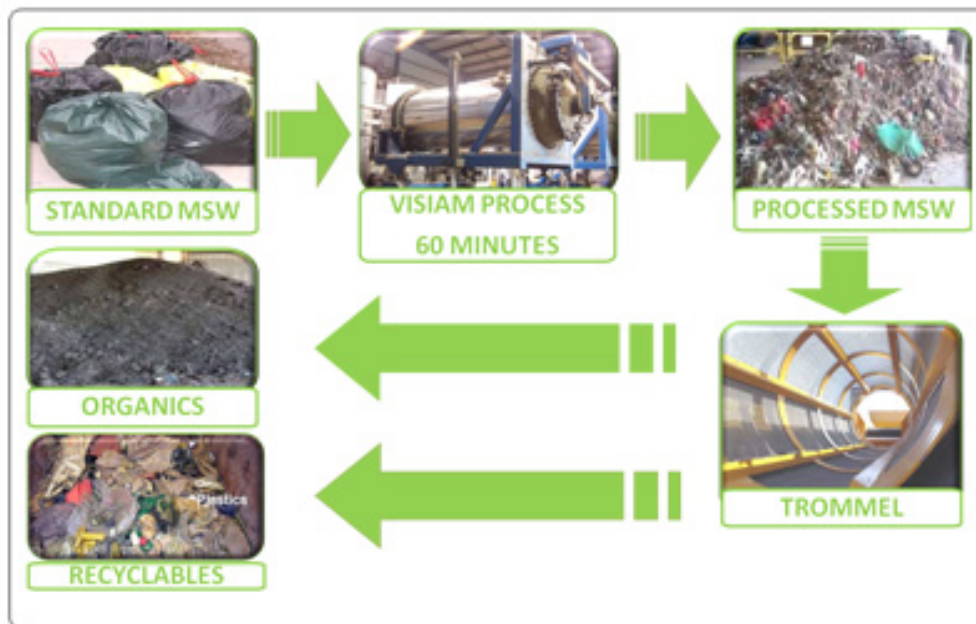


Figure 64: Visiam Processes Diagram. Graphic by Visiam.

contents stew for about an hour and then the processed waste is removed, automatically sorting itself in to recyclables ready for reuse and the organic matter that may be converted to energy.<sup>54</sup>

## 9.2 Values

Given the established value system, I sought to create a design that would respect each value sphere and form a holistic innovative and education public destination. Designating a program that would be beneficial economically, have educational and social justice components and highlight the historic architecture was step 1. Tracking the values over time, one can see what was important at each stage in the building's life.

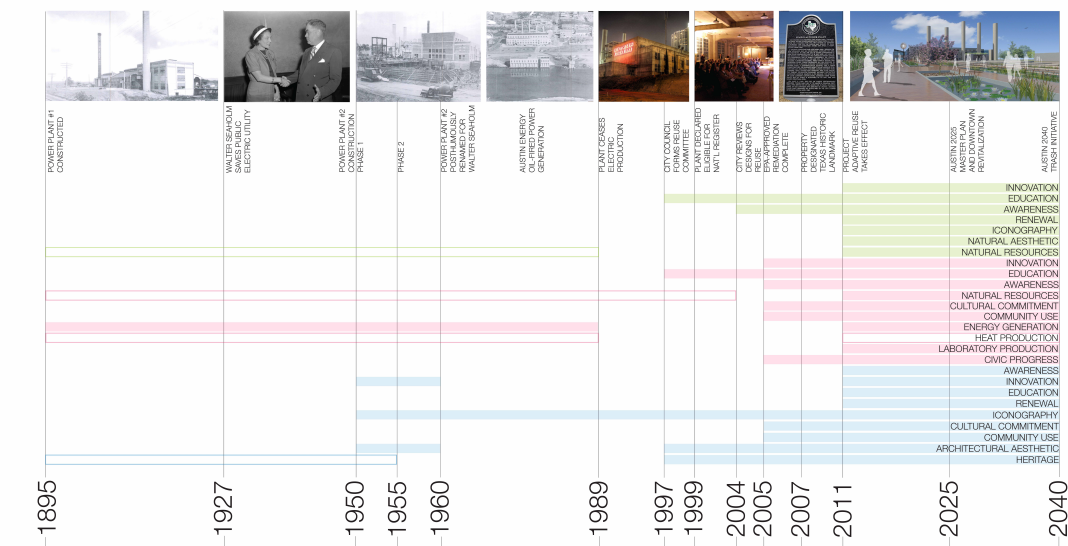
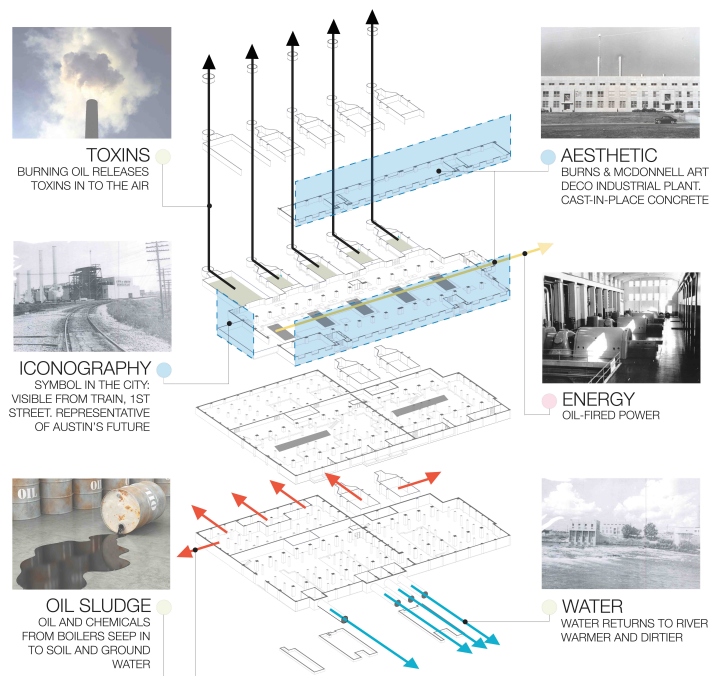


Figure 65: Values Timeline, Graphic by Author

<sup>54</sup> Interview with Scott Hughes, COO Visiam. May 11, 2011.

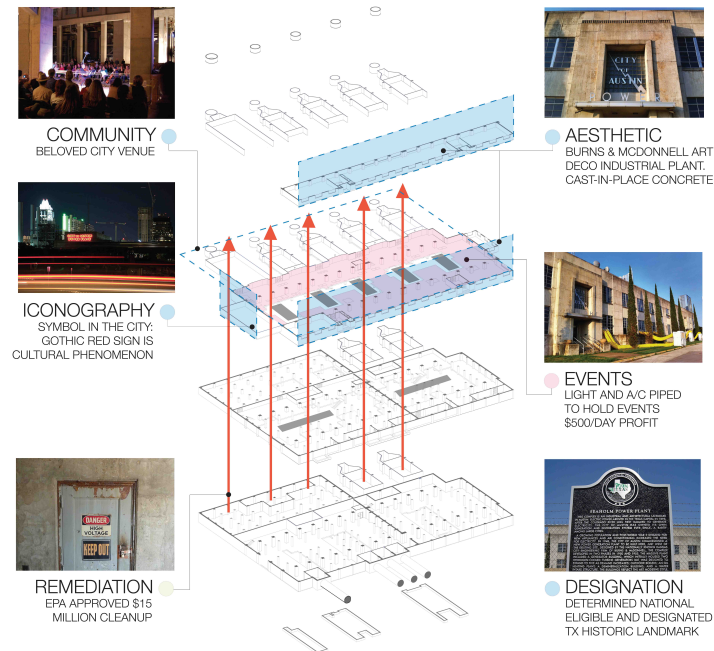
During the first stage of the Seaholm Power Plant's existence, its values were primarily economic. It was a city power generator and provided income to Austin Energy in exchange for a service. There were value liabilities during this period: in 1960 Power Plant #1 was demolished, indicating a heritage value liability. The oil-firing power production process was also a tremendous liability to the environmental conditions on the site. The value conditions in the 1950-1989 period may be found in the following figure:



**Figure 66: Values 1950-1989. Graphic by Author.**

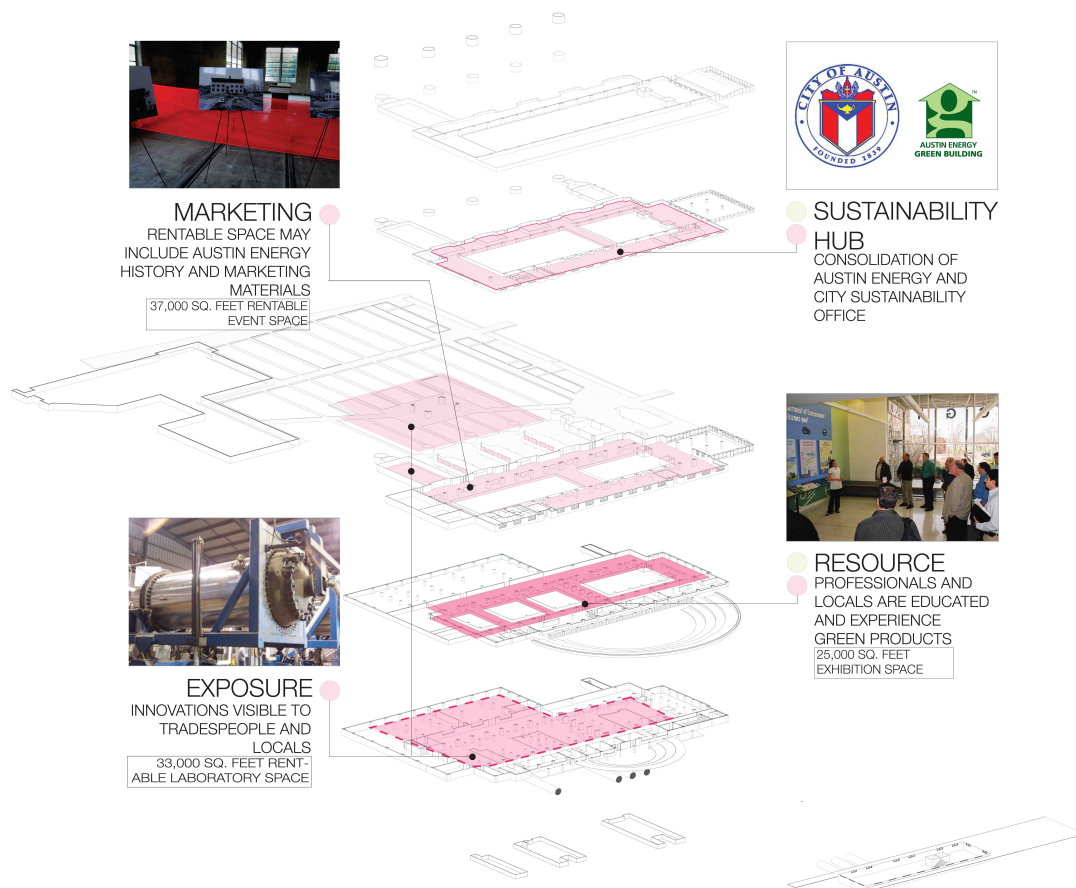
Between 1989-2011, the “era of discovery,” the Seaholm Power Plant changed quite a bit. This was a period of post-production, remediation and discovery. Now that Austinites are allowed in the plant, there has been a tremendous spike in cultural value appreciation. Environmental values have increased since remediation in 2004,

as have economic values. Now that the space is leasable it is earning small sums of money for the city, but nothing near its capacity.



**Figure 67: Values 1989-2011. Graphics by Author.**

For my intervention in the Seaholm Power Plant, my goal was to meet as many values as I possibly could. I diagrammed my findings by value: economic, environmental, cultural, but found that a good sustainable project will have such a mixing of values that it is nearly impossible to distinguish one value's presence from another's. A healthy mix is essential in a truly sustainable project. Please take notes that the original value venn diagram was divided in to 3 colors: red for economic, green for environmental and blue for cultural. This color designation has been maintained since in the value timeline (figure 65 above) and will continue to show up throughout all of the rest of the final drawings.

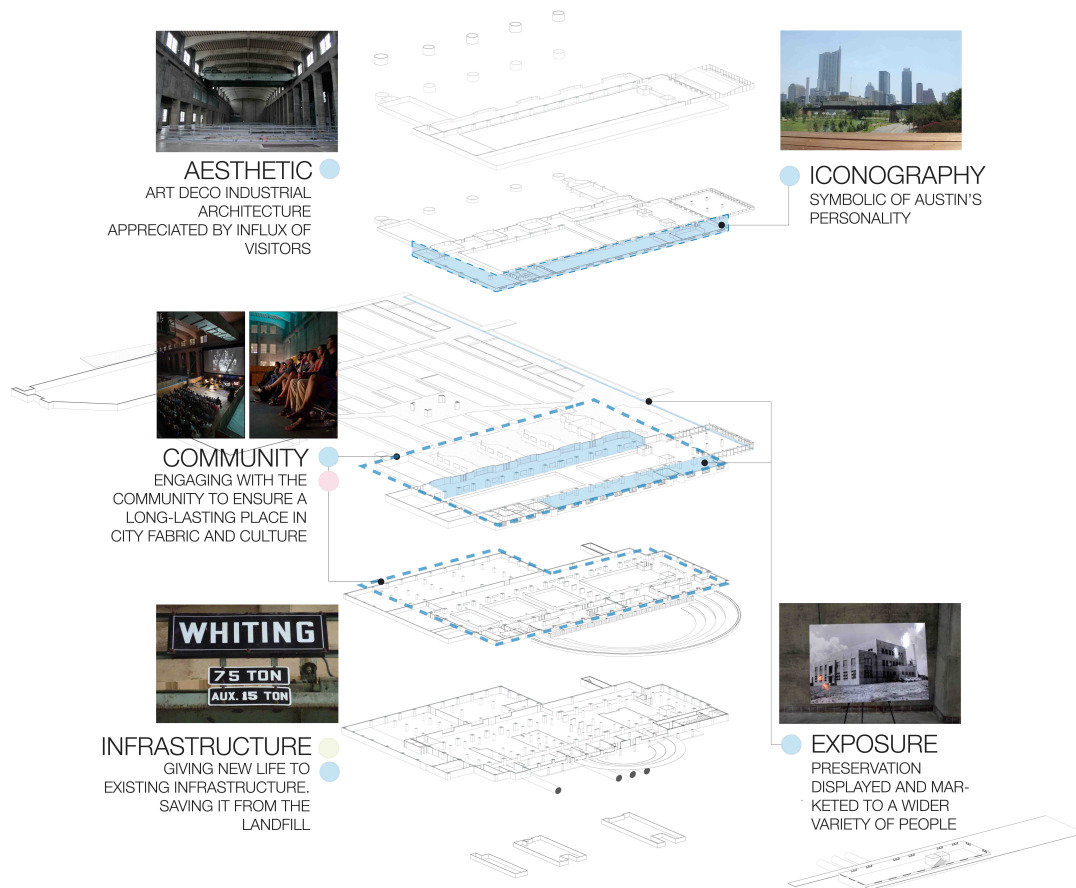


**Figure 68: Values, Economic. Graphic by Author.**

For my intervention to be successful, there must be a strong economic backbone to make Austin Energy's investment worthwhile. As aforementioned, this is a tremendous marketing opportunity for Austin Energy. With the new influx of people that will be visiting the space to attend an event or get advice at the GBRC, marketing in the form of historic photos or Austin Energy Green Building history would be viewed by many. Aside from being a sustainability hub and resource for local professionals, the space will also bring in a much higher price tag for daily rentals. With the new amenities provided, rentals will no longer be \$500/day. The leasable technology research space will also bring in quite a bit of revenue per month. This space will be rented by technology companies and going rates will only increase as the popularity of the building grows. Further, technologies like Visiam produce



marketable byproduct that may be sold or reused. Visiam produces compost, biofuel, ethanol and other items that could be used on site for gardening, be sold to companies off site or, in the future, lead to on-site electricity generation.

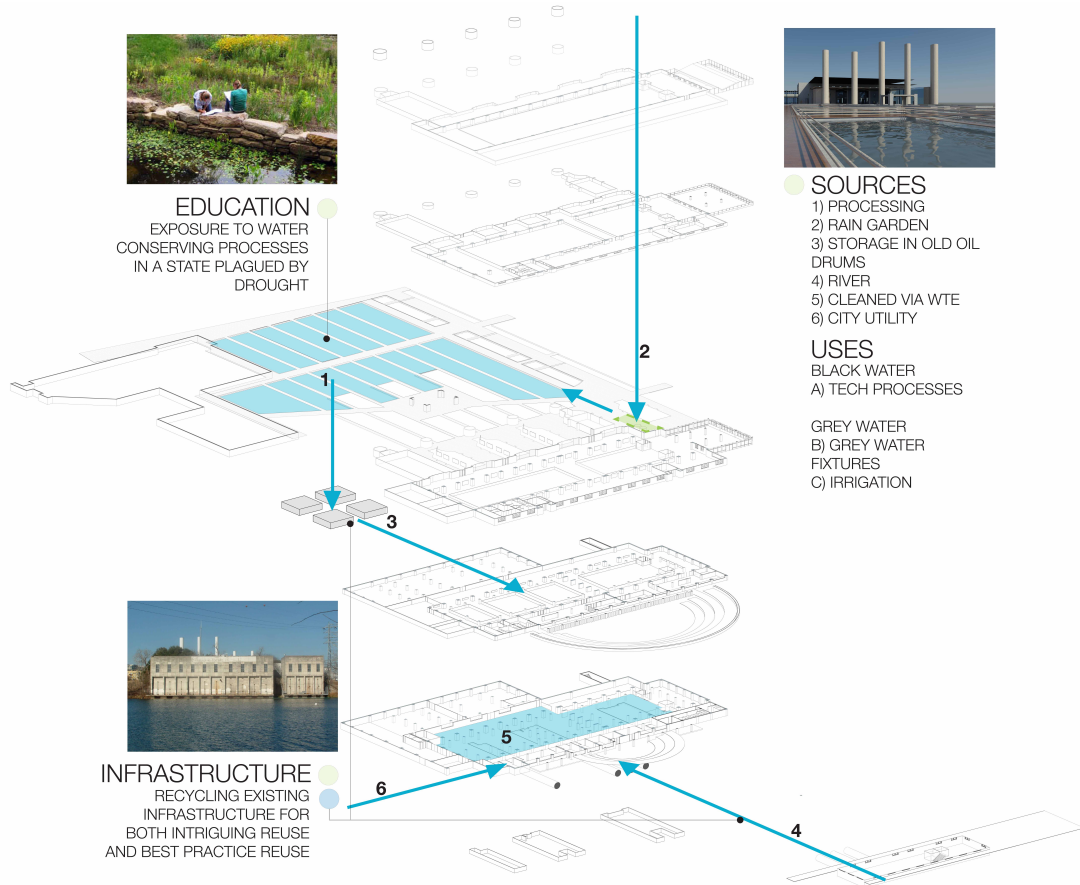


**Figure 69: Values, Cultural. Graphic by Author.**

This new influx of people will also be able to enjoy the built Austin heritage that is the Seaholm Power Plant. Many people who have little to no exposure to historic buildings will be educated on their meaning and value in the community. The city will continue to serve as a beautiful example of art deco industrial architecture, as was intended in its preservation, as well as an icon in the city of Austin. The community will achieve a greater level of interaction with this building than ever before. This serves to perpetuate the sustainability of the building as when the

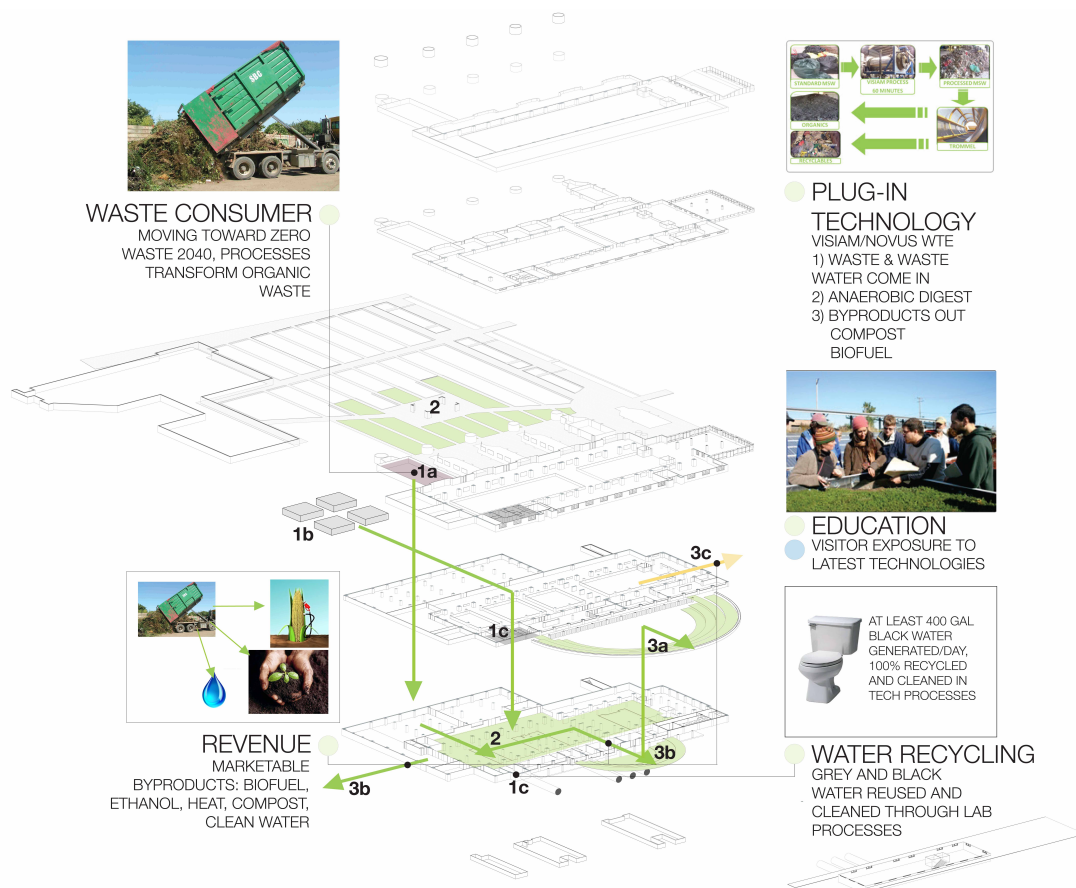


community is engaged and cares about the structure, it will ensure the building's place in the city fabric for years to come.



**Figure 70: Values, Water. Graphic by Author**

Utilizing historic infrastructure for modern purposes was a major driving theme. Adapted from the original use of the oil-fired power generation two systems have been set up, the first being water recycling. Utilizing the existing water intake structure and underground piping, as well as the old oil storage drums, this building will recycle all of its water and draw very little from the city grid. The water sources include treatment gardens on the north end of the site, a rain garden, water storage in the old oil drums, processing from the river, water cleaned via waste-to-energy processes (Visiam) and the city utility.



**Figure 71: Values, Technology. Graphic by Author.**

The technology processes follow the same north-south flow that the original processes did. Organic waste is brought in for Visiam process and dumped in to Boiler #5, which is now encased in glass for visitor visibility. Other waste sources include building-produced grey and black water. These types of waste move to the lower basement where they are processed. The byproducts are then moved south to the amphitheater gardens or west to the loading dock (for exportation of marketable byproducts). Some of the produced compost is also used on the northern part of the site. While the building once imported oil and produced energy and waste, it now imports waste and exports energy.

### 9.3 Design

The first component of design addressed was the site plan. As was made evident in the City of Austin analysis and Seaholm Power Plant analysis, this site is advantageously situated. The north-south movement was very important here, again. When oil was originally brought on to the site, it was from the north gate and moved south. The new light rail station will also be situated on the north side of the site.



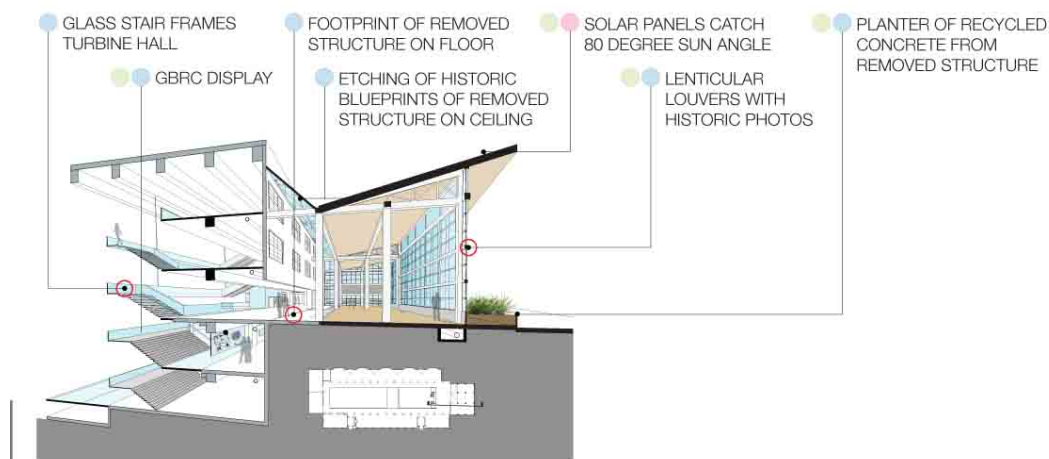
**Figure 72: Site Plan. Graphic by Author.**

Most visitors to the new Seaholm Power Plant will enter from the north side of the site via car or the new light rail. If arriving by car, parking can be accessed in the northwest corner of the site and then exited in either of the areas indicated in red. If coming by light rail, one would exit the station in the north and travel down the axis on the east edge of the site. If traveling from the new 2<sup>nd</sup> street designated pedestrian corridor, one would emerge directly facing the stacks on the boiler plaza. If being dropped off by car, visitors will exit their vehicles on to the original train tracks that enabled power plant employees to bring heavy equipment in to the building. These tracks still scar the site. The primary path of travel has several notable features. The first is the drainage garden that runs from the north to the waters edge. The second is the “heritage wall.” This wall borders the garden that divides the road from the main path of pedestrian travel and is imprinted with historical facts about the building. This wall dead-ends in the new entrance wing of the building.

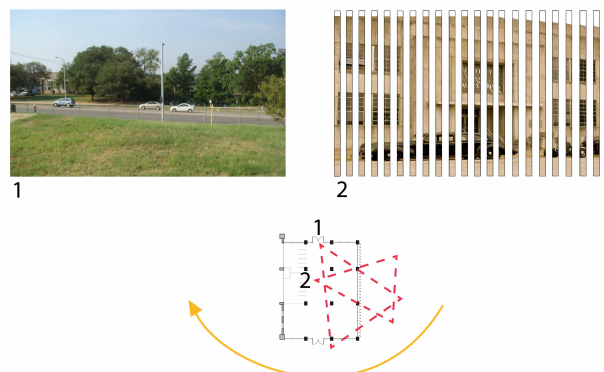


**Figure 73: North Site Perspective. Graphic by Author.**

The new wing is the greatest feature that alters the historic fabric of the Seaholm Power Plant. The purpose of the addition was to create a neutral entrance space (rather than utilizing an existing door). It also provides for a grand dramatic view of the long axis of the Turbine Hall. The new wing has three iconic features that respond to both preservation and historical integrity and sustainable features. The first is a lenticular louver system. These louvers will protect the eastern facing curtain wall from too much sun while showing pieces of history. The louvers will be printed with historic photos in a lenticular fashion – from different angles, visitors will either see the view of the street and river beyond, or a photo of an historic image.



**Figure 74: Section Perspective. Graphic by Author.**



**Figure 75: Lenticular Louvers. Graphic by Author.**



Other notable features include a palimpsest on the floor of the existing bathroom that had to be removed for the construction of the new wing. This area is the northwest



**Figure 76: Palimpsest Swatch. Graphic by Author.**

corner of the new wing and it shows the scars of what once was. On the ground in the new wing, one will see the original concrete floor, mortar joints, shadows of bathroom partitions and wall tile coving

to meet the floor. The area removed may be seen in the photo below, Figure 77.

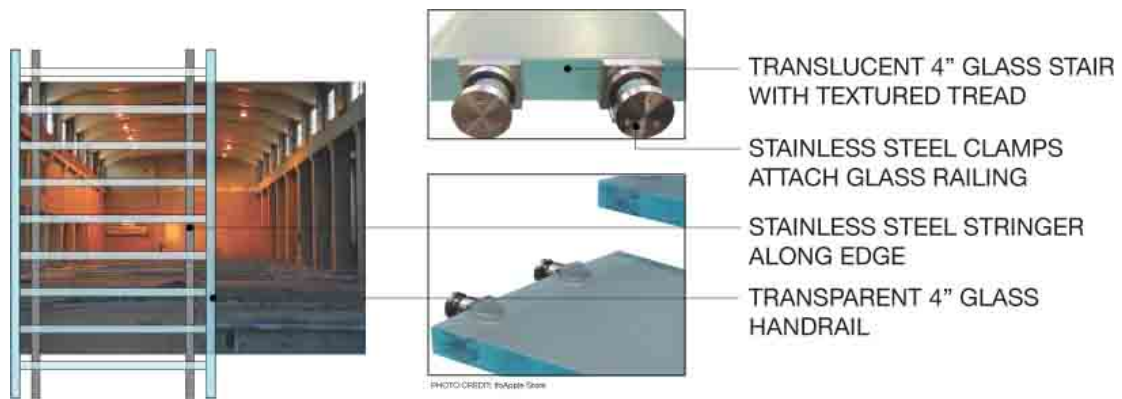
Above the palimpsest floor is a skylight. Etched on the skylight are the original blueprints of the removed portion of building. This skylight is at an angle perpendicular to the angle of the Austin afternoon sun so that the blue prints cast



**Figure 77: Removed Building Section. Photo by Author.**

a shadow on the floor of the new wing. The final notable feature of the new wing is its connection to the Turbine Hall. Upon moving through the new wing to the Hall, one passes under a new mezzanine floor and has a dramatic new view of the Turbine Hall's long axis, framed through a suspended glass stair. Glass elevators flank each

side of the turbine holes and a glass stair is suspended in between. Aluminum stringers support the stair and bolts connect a glass handrail to the translucent glass stair treads. The result is a framed view of the Turbine Hall that is beautiful, contrasting and dramatic.



**Figure 78: Glass Stair Detail.**



**Figure 79: Turbine Hall Perspective. Graphic by Author.**

The facades have been left relatively in tact but serve to respect both sustainable initiatives and historic integrity. The first priority to weatherizing this building was the addition of insulation. To do this, insulation was added to the inside of the wall and clad in gypsum board in the 1955 portion of the building, while the 1950 portion was clad in a suspended green wall to protect from the climate. This both allows for insulation and is a lesson in history. Visitors are able to ascertain the joint where the building was patched together both from the interior and exterior, based on its treatment. Another priority that affected the exterior of the building was allowing light and air in to the basement. This previously very dark, very still area has been excavated on the south side to form an amphitheater. The walls have been exposed and punched with windows and doors, creating an environment that is lovely to inhabit and improves the quality of life within the basements. The amphitheater now affords a view of the south façade that was not previously enjoyed by visitors.

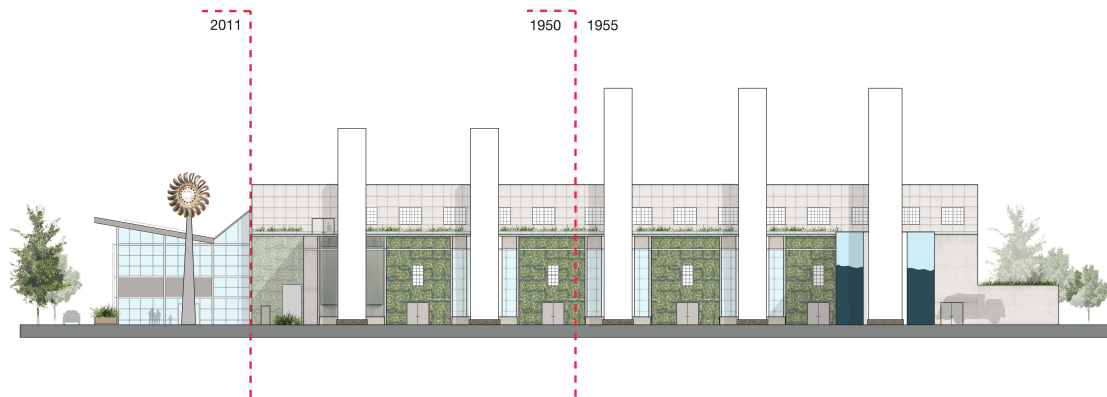


**Figure 80: South Facade. Graphic by Author.**

On the north façade, the three middle boilers have been removed leaving boiler #1 in its historic form (closest to the entrance wing) and boiler #5 in use for the technology



systems. The addition of an historic turbine mounted artistically in the place where a sixth stack would be (in front of the new wing) rises above the building as a marker of the main entrance. This turbine not only is an historic, beautiful icon but it may be able to pull in a small amount of wind energy.



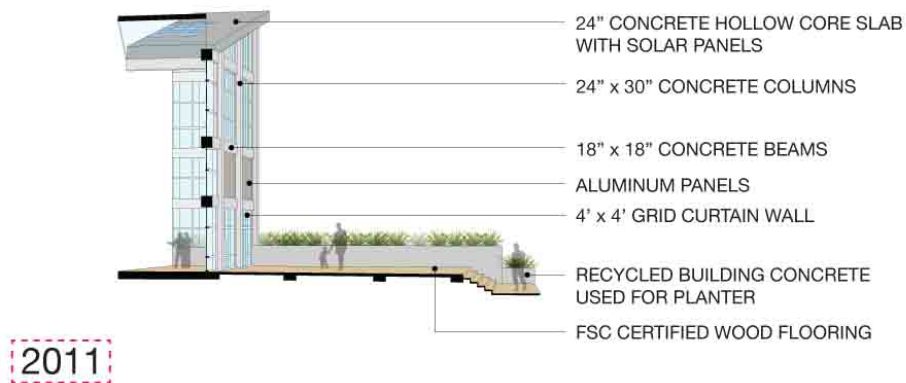
**Figure 81: North Elevation. Graphic by Author.**



**Figure 82: South Wall Section 1. Graphic by Author.**



**Figure 83: South Wall Section 2. Graphic by Author.**



**Figure 84: South Wall Section 3. Graphic by Author.**

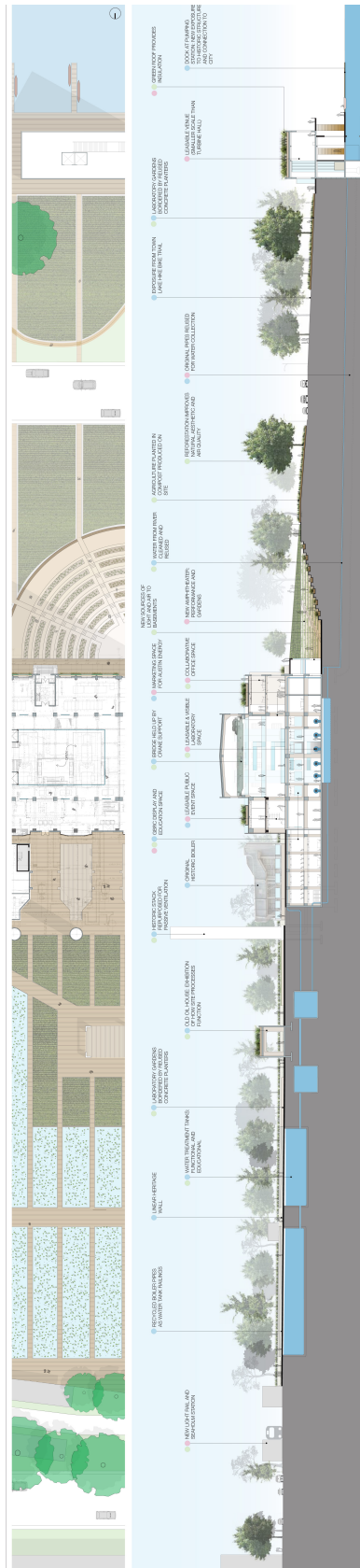
The materials chosen for both the interior and exterior interventions on the existing historic building were selected for their high contrasting value. I felt that the historic integrity of the existing structure was best served by highlight the difference between new and old. On the site, the primary new material was wood for all of the paths (which then moved in to the floor of the new wing). Within the plant itself, glass was the primary new material. Some steel was utilized, as well. As the existing building was solid cast-in-place concrete, any material other than concrete was an obvious addition.



**Figure 85: Lower Basement Perspective.**  
**Graphic by Author.**



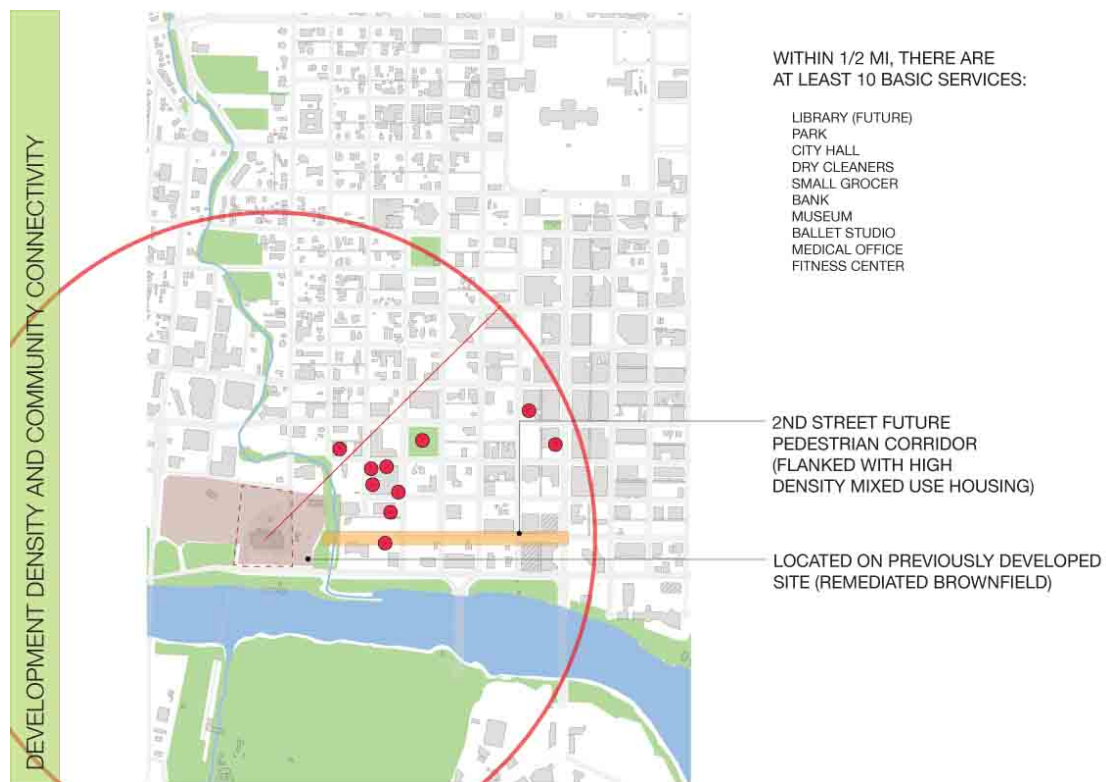
**Figure 86: Mezzanine Offices Perspectives.** Graphic by Author.



**Figure 87: Large Section and Plan. Graphic by Author.**

## 9.4 LEED HP

While this project did not reach the level of detail of how it would meet energy and water requirements for the LEED HP criteria, there were considerations of each credit it may achieve. In the sustainable sites category, this project should have no trouble achieving the development density and community connectivity credit. This credit requires the close proximity of at least 10 sites of common necessity. This project more than meets this threshold.



**Figure 88: Development Density and Community Connectivity Credit Diagram. Graphic by Author.**

As this site was previously a toxic brownfield, it obviously meets this credit. For the Alternative Transportation credits, all three have been considered. The public transportation credit is also a slam-dunk due to existing bus lines and the proposed

light rail. The bicycle credit has been addressed by the addition of showers on the ground level and bicycle racks.



**Figure 89: Alternative Transportation Credit Diagram. Graphic by Author.**

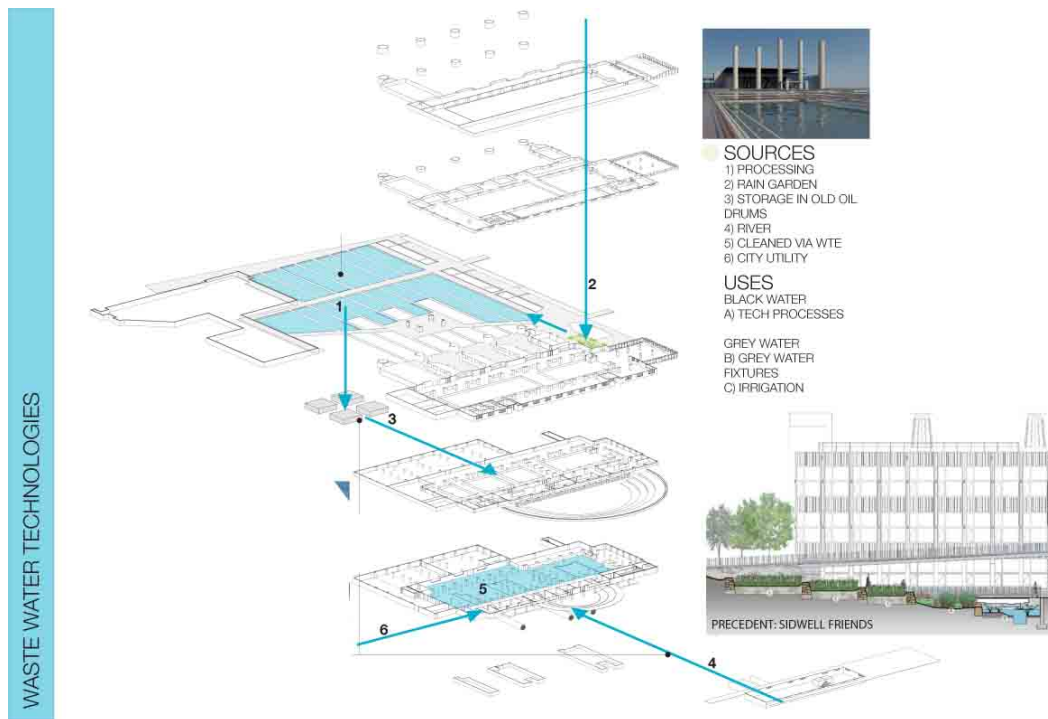
The Low E vehicle portion of this credit will be achieved by designated parking spaces along the road on the east side of the site, adjacent to the new wing entrance.





**Figure 90: Alternative Transportation Credit Diagram 2. Graphic by Author.**

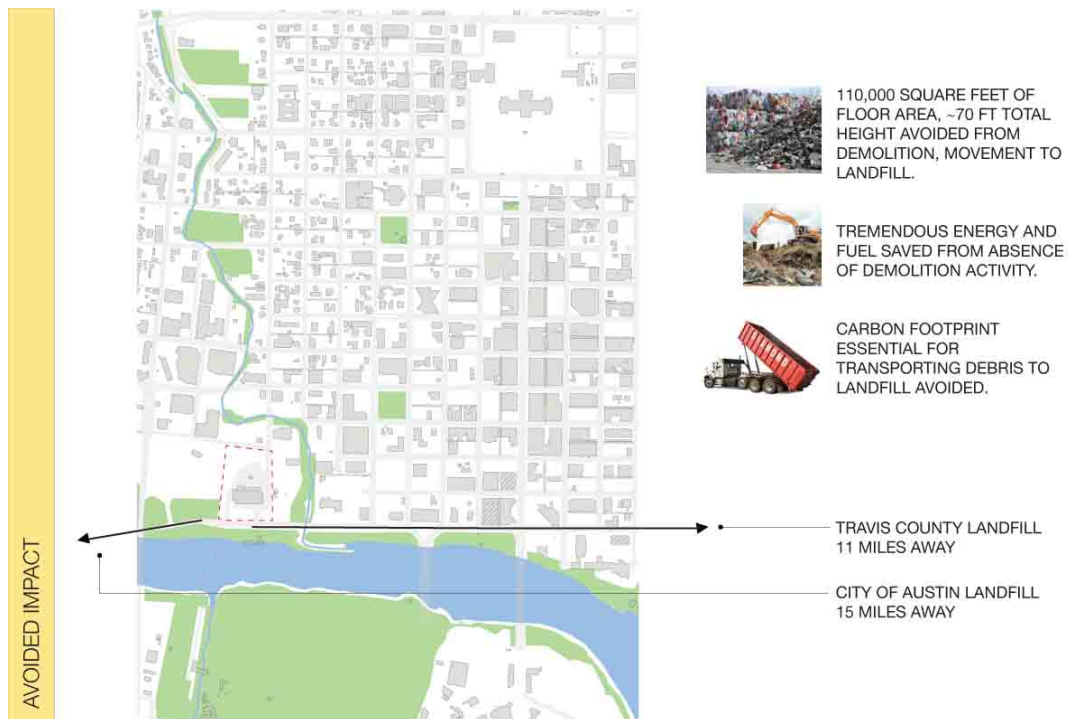
This project is set up to meet all of the Water Efficiency criteria on the LEED HP checklist. All landscaping is xeriscaping that uses no water and any irrigation necessary for crop growth will be recycled gray water. No water will be used from the city grid for purposes of irrigation. Waste water technologies are obviously utilized on site in the various treatment tanks and processed water storage areas. With low flow fixtures, water recycling and water cleansing systems, the building will greatly reduce the amount of water from the city grid used in any building activities.



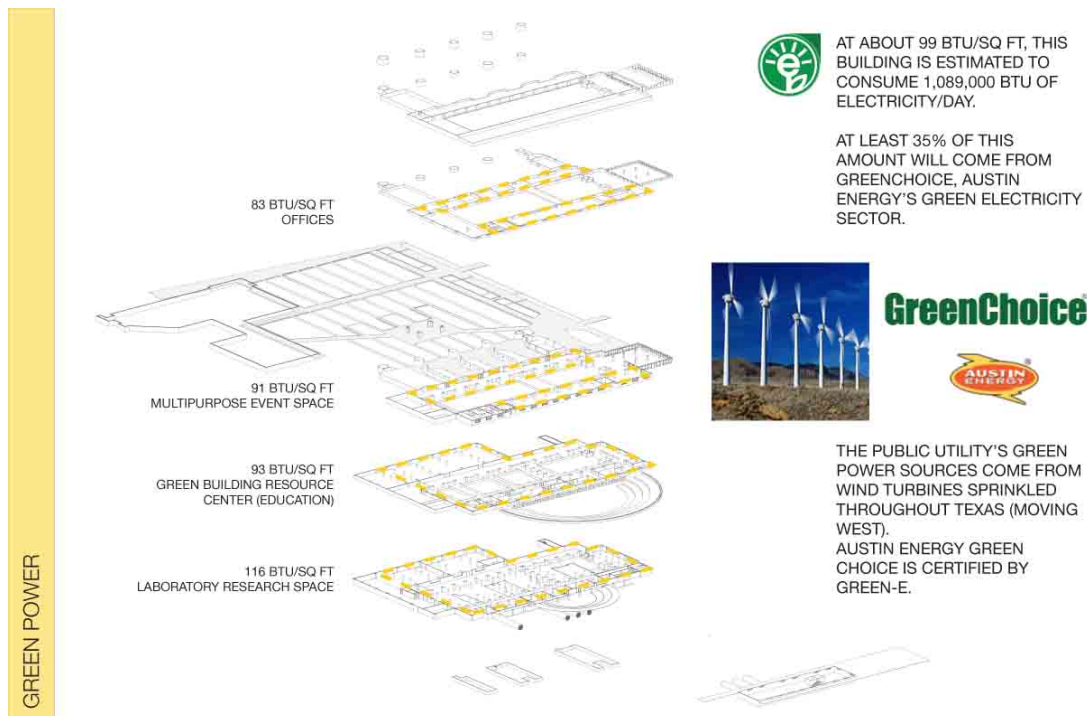
**Figure 91: Waste Water Technologies Credit Diagram. Graphic by Author.**

All credits in the Energy & Atmosphere credit will most likely be met, with the exception of On-Site Renewable Energy. While there are solar panels on the roof of the new wing and the historic turbine may produce a small amount of wind energy, these are slight amounts compared to how much the building needs. The other credits would be easily achieved with the help of an engineer. The two most important credits here are Avoided Impact and Green Power. Austin Energy has a green power section called “Green Choice.” This could easily be commissioned for 100% of the electricity utilized in the Seaholm reuse. Obviously the Avoided Impact credit is critical here. The 110,000 square foot concrete building with an even greater volume could have simply gone to a landfill. The sheer power necessary to demolish this building, let alone construct a new one would take decades to remediate.





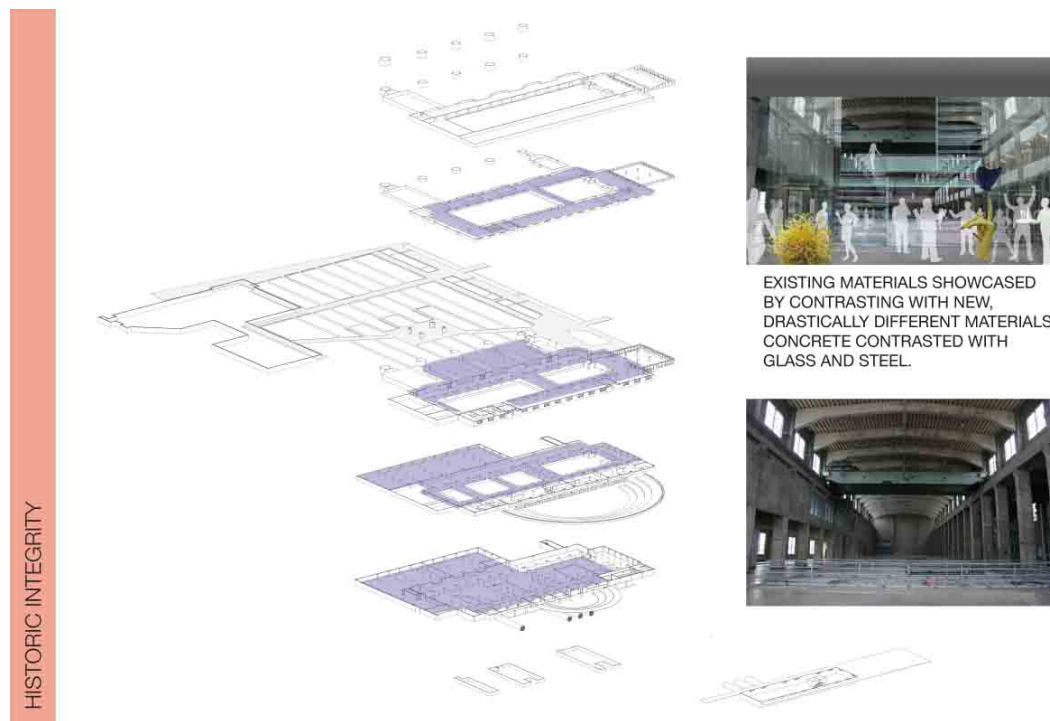
**Figure 92: Avoided Impact Credit Diagram. Graphic by Author.**



**Figure 93: Green Power Credit Diagram. Graphic by Author.**

The Materials and Reuse credits are quite easy to achieve, as well, with the exception of Rapidly Renewable Materials and Recycled Content. While these two credits

would most likely be feasible, I did not reach this level of detail yet. Obviously the building reuse credits are easily achieved at a very high threshold, as 90% of both existing exteriors and interiors have been protected in generally their existing form. The new Historic Integrity credit has been achieved by the use of contrasting materials in any interventions. The old and new may be distinguished and artfully compared.



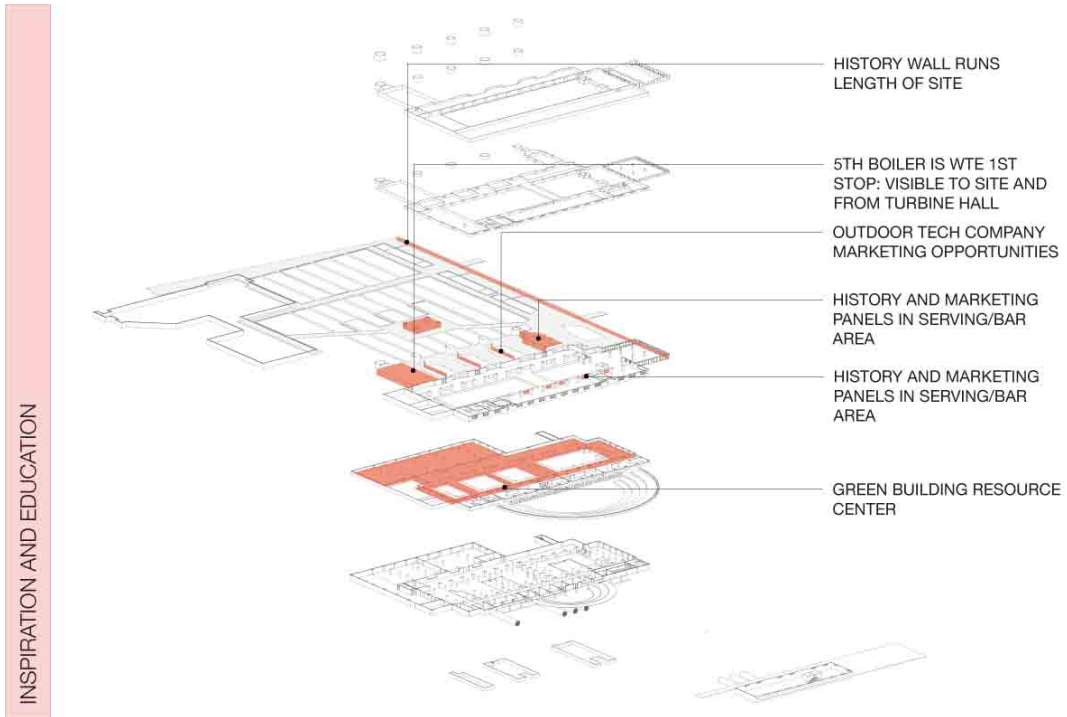
**Figure 94: Historic Integrity Credit Diagram. Graphic by Author.**

To achieve the materials reuse credit, the few walls or pieces removed from the power plant will be reused throughout the site and gardens. Removed concrete will be utilized as planters in the gardens on both the north lawn, south lawn and north of the Water Intake building. The handrails to protect visitors from falling in the water treatment tanks are made of recycled piping from within the boilers.

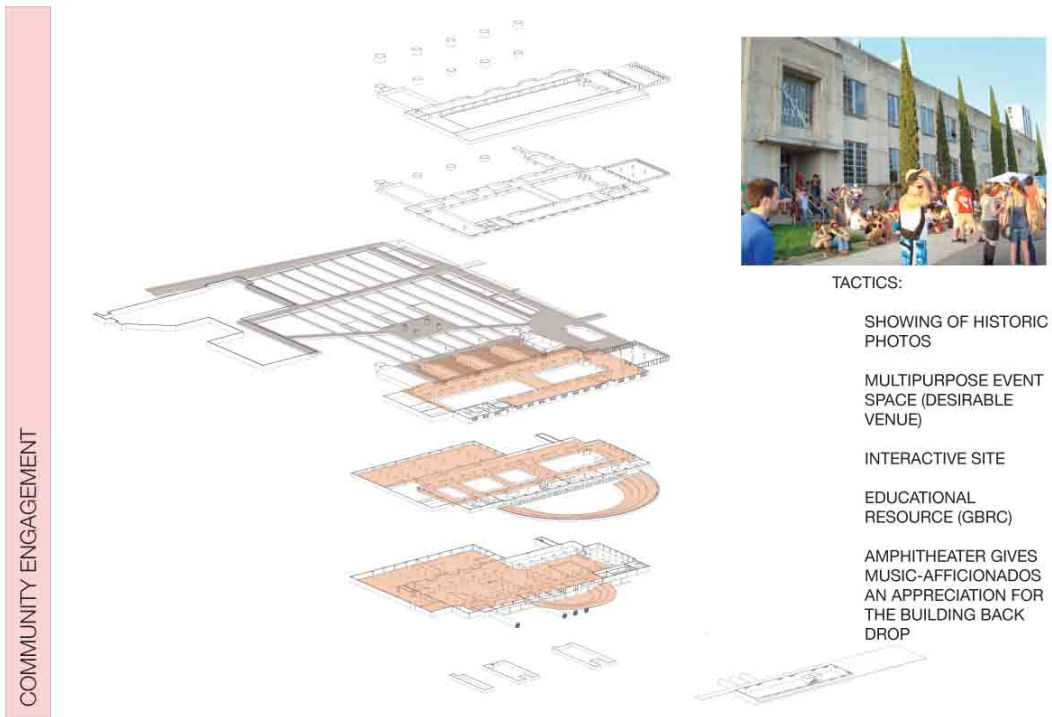


**Figure 95: Materials Reuse Credit Diagram. Graphic by Author.**

The new category of Social Justice and Equity was by far the most important of all. It was essential for me to achieve a high standard of each of these credits. The entire site is meant to be an educational and innovative experience. From the outset, the history wall guides visitors in teaching them about history. The old oil house serves as a small exhibit area to explain how the water processes on the site work. The historic boiler near the entrance is a visual reminder of how the original processes worked. The Green Building Resource Center is an entire educational program component. It may be utilized by students or professionals, but either way it is a complete educational experience.

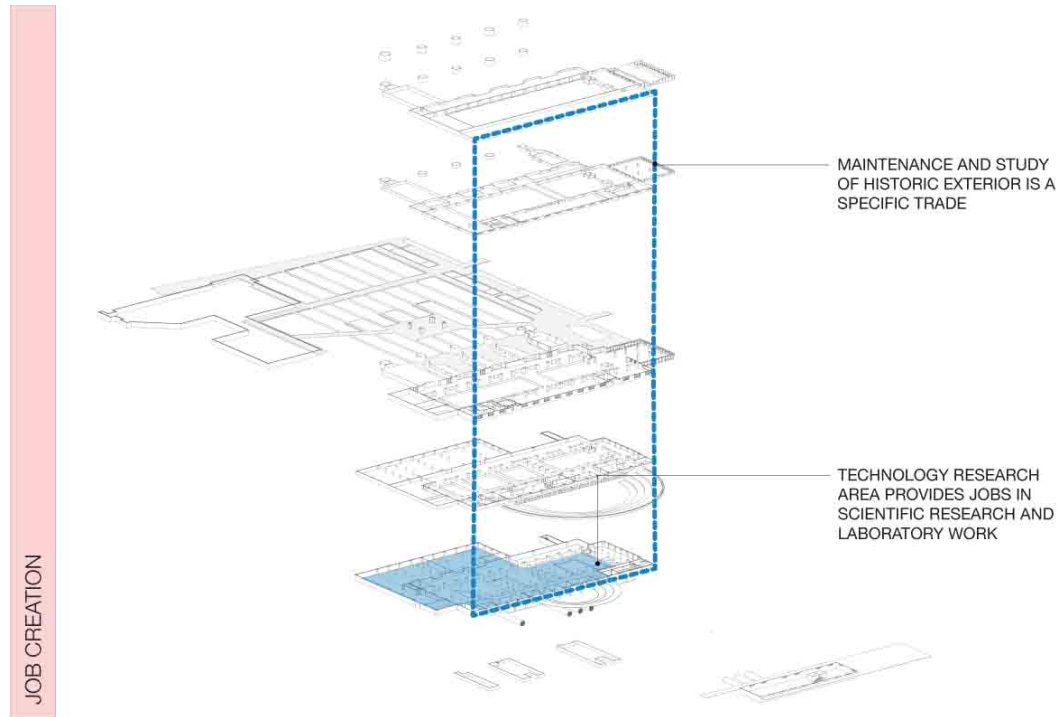


**Figure 96: Inspiration and Education Credit Diagram. Graphic by Author.**



**Figure 97: Community Engagement Credit Diagram. Graphic by Author.**

To ensure that the community is connected to this historic relic, the entire building is designed to engage the public and foster a long-standing relationship. Particular tactics that are utilized are the showing of historic photos, the encouragement of the use of the Turbine Hall as an event space, an interactive site that is both historical and progressive and an amphitheater that has the beautiful southern façade as a backdrop.



**Figure 98: Job Creation Credit Diagram. Graphic by Author.**

Jobs will be created both in maintaining the historic structure and the technology processes. The maintenance and construction on historic structures employs professionals to monitor the building (the Texas Historical Commission), as well as particular tradespeople who specialize in construction on these building types.

## CHAPTER 10: PUBLIC DEFENSE AND CONCLUSIONS

When this thesis started I knew that the scope was vast. The issues between preservation and sustainable design have not yet been solved by professionals and are quite complex, and the adaptive reuse component was a very large building. So while many elements of this thesis remained relatively schematic, in my opinion, I am overall quite pleased with how it turned out. While it would have been ideal to reach a level of concrete, detailed design solutions for how the Seaholm Power Plant might be reused, it was not in the cards for the timeline allotted.

This thesis was presented for public defense at the School of Architecture, Planning and Preservation on December 12, 2011. The comments centered around the lack of detail reached in specific building operations. The general sentiment was that the project was schematically very well thought out and presented to the point that the audience was “sold,” but now they wanted more. Had I more time, I would address issues of lighting, HVAC, fireproofing and particular wall construction.

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